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REPORT OF A CASE OF MOLLUSCOID FIBROMATA IN A HEIFER.

BY AUSTIN PETERS, M.R.C.V.S.

I THOUGHT the following case might be interesting, as it is unlike anything I have ever seen before.

January 31st, I went to the farm of Mr. H., at Concord, Mass., the owner having requested me to come out there, a few days previous to the above date, to see a two-year-old Jersey heifer which had a lot of "little tumours on her belly, which look more like a lot of mushrooms growing upon her" than anything he could think of.

The heifer was indeed a sight to behold. The under surface was a mass of warty-looking tumours, hanging down several inches, extending forward to within three or four inches of the fore legs, and backward covering the udder, and extending some distance up the escutcheon. They were pedunculated, massed closely together, and varied in size from a pea to a hen's egg. Their surface was smooth and devoid of hair, and they looked very much like a cluster of small potatoes, or, as the owner suggested, "mushrooms," depending from the ventral surface of the body. I started to count them, but as I had to take a train back to Boston, found I had not time, but estimated their number at from six to eight hundred. I removed two or three of the largest by twisting them from their pedicles. When fresh cut in two with a knife, the cut surface presented a pearly, glistening appearance, and a quantity of serous fluid dripped from them; at the base, blood-vessels entering them could be clearly seen, which in dividing and spreading through the substance of the tumour gave a very pretty injection appearance. In some of them one or

two spots of extravasated blood were to be seen, due to rupture of small vessels.

Specimens of the tumours sent to the Pathological Department of the Harvard Medical School were pronounced by Dr. Sears to be Molluscoid Fibromata.

The growth has been very rapid, as it was not noticed until the animal was brought up from pasture last fall, and then looked like only a few small warts. A number of small warty growths had begun to appear on the under surface of the tail, on the near shoulder, and in places on both sides of the neck.

As I did not deem it worth while to try treatment, the animal was destroyed.

ASTHMA.

BY J. C. BERNE, V.S. (1ST CLASS), A.V.D., PORTSMOUTH.

A CASE which came under treatment at Hilsea on the 5th June, has convinced me that Asthma should be classified as a disease *per se* in the horse; and that, consequently, it is incorrect to make it a synonym for Broken-wind.

On this morning the patient, a grey mare over sixteen years old, was sent to the infirmary stables from the riding school, where she showed symptoms of great distress, leading to the opinion that she was suffering from congestion of the lungs.

When I saw her, one indeed would be inclined to think that this diagnosis was not far wide of the mark; for there were the hurried respirations and flapping nostrils, so far indicative of hyperæmic congestion.

Against this idea, however, I found that the pulse was comparatively undisturbed, numbering 47; temperature, 100⅘°; respirations, 32. These were of a wheezing character, simulating capillary Bronchitis; and there was a muco-purulent discharge from the nostrils. The mare had an anxious look, but not very pronounced, and when at times she went to the door of the box, she evinced rather a playful mood towards the patient in the one next to hers.

There was no change next day. On the 7th I was obliged to visit an out-station, and consequently did not see her that day; but on my visit next morning I found her all right—pulse, respirations, temperature, etc., normal.

The veterinary history sheet of the mare has no record of any previous attacks like the one under notice; nor any as affecting the air passages. From inquiries, I ascertained that during the past eight months or so she had been sent from the riding school

on account of her having shown symptoms which were marked by urgent distress. They passed off quickly, lasting only for a few hours, never for a day; and for this reason, I suppose, not brought under my notice.

That Asthma is a separate and distinct disease in the horse, must, I am of opinion, be recognised. In the symptoms I have given here, there is an absence of the most important features which mark congestion of the lungs; and the transitory nature of the illness puts it out of the question to identify it and Broken-wind as one. The treatment the mare received were occasional doses of spts. æth. nit., and spts. ammon. aromat.

CHRONIC LARYNGITIS.*

UNDER this title I shall describe chronic Laryngitis, considered as a termination of simple acute Laryngitis, and occasioned or kept up by obstructions of a glandular or other nature.

It is characterised sometimes by a mild inflammation of the mucous membrane with obstruction, or by ulceration of the tissues; sometimes by obstruction of the cartilaginous tube without apparent lesion of the mucous membrane.

Causes.—When chronic Laryngitis is a termination of simple acute Laryngitis we know the cause, namely, the use of some treatment not well indicated, or the neglect of treatment. Chronic Laryngitis is sometimes manifested after unskilful operations performed on the larynx, which have not been sufficiently successful to remove the cartilages, but have caused inflammation leading to the obstruction and welding of the cartilages together, and, in consequence, to shrinking of the tube. Chronic Laryngitis sometimes also results from glandular enlargements situated round the larynx.

Symptoms.—A short, whistling cough, which is produced without contraction of the larynx, acute at all times, but especially during deglutition of a large bolus and after drinking very cold water, is in most cases the only symptom of chronic Laryngitis, so long as it is still simple Laryngitis, and when the mucous membrane of the larynx has not undergone marked ulceration, when it has not become "enlarged," and has not caused contraction of the windpipe. If, on the contrary, it is aggravated in this way, besides the cough we find more or less troubled breathing, always a little noisy, even when the animal is asleep, and especially so if eating or moving. When the disease is further advanced the animal, even when well looked after, becomes emaciated, with a dry skin and rough coat.

* Translated from Cruzel's Treatise, by R. W. B.

But a pathognomonic symptom of this disease is that the muscles of the cervical region are more wasted than other muscles. I call attention to this symptom, because from the moment it is noticed no treatment is of any avail. All attempts at fattening and treatment will prove useless. This remark about loss of condition applies to all chronic diseases in cattle, and chronic Laryngitis which has lasted some months is nearly always complicated with Bronchitis of the same nature at first, but afterwards of a "tuberculous" nature. When there is thickening of the mucous membrane, it sometimes happens that the aggravation of the evil only slowly declares itself; cattle affected with wheezing sometimes seem to be in good health, and the wheezing does not appear to get worse. There are cattle which work all day, and whose breathing is noisy only when they are making great efforts; this wheezing may exist without there being evidence to show that there are lesions in parts of the respiratory passages other than the larynx. Often I have been called to diagnose the state of cattle affected with wheezing, which the owners suspected to be tubercular Phthisis. But I never found Phthisis and wheezing coexistent; yet I have found cattle which breathed hard when working, which were not phthisical. One such, which, having been the subject of a dispute, had been sold to the butcher at the end of a transaction which I had managed, showed a very apparent lesion in the larynx and a non-tubercular lung. If chronic Laryngitis is occasioned by the drawing together of the cartilages of the larynx or by their being blocked up, the cough has a peculiar character; it is produced by violent contractions of the muscles of the thorax. The breathing is whistling in character, even in sleep; but when the animal eats or works it is noisy and jerky. If Laryngitis is kept up by the pressure exerted on the larynx by obstructions which are developed in its circumference, the symptoms vary according to whether the pressure is continual or momentary. In fact, the growths adhere sometimes in such a manner to the subjacent or surrounding tissues that they exert constant pressure; when they are movable and are displaced by certain movements, their action not being the same, the symptoms are either mitigated or are aggravated. When the enlargement is not displaced the cough is incessant and the breathing always troubled; if it is easily displaced frequent manifestations of one or the other symptom are noticed. Sometimes these tumours are formed by fibrous connective tissue (*lardacé*) without cavities; sometimes they have cysts in their centre, hollows divided by bands (*brides*); sometimes they are thyroid glands which, in consequence of a contusion or puncture, become indurated.

Progress. Duration. Termination.—Its progress is very slow; consequently its duration is long, or at least its duration would be

long if one had not the chance to make some use of the animal by handing it over to the butcher. As to its termination, it will be inevitably fatal in most cases, without the resource of which I have just spoken.

Lesions.—The *post-mortem* examination of animals which have died of this disease, or been sacrificed during its progress, shows redness of the mucous membrane of the larynx, and a softening or a thickening of this membrane. At other times the cartilages are enlarged and indurated, they are drawn together, and the glottis is more or less contracted. I have already mentioned the tumours complicating this disease.

Diagnosis. Prognosis.—It is characterised by few symptoms, very striking and, so to speak, isolated, and it is not difficult to distinguish it from other diseases of the air passages. It will suffice, in order to characterise it, to mention this whistling, jerking cough, noticed when the animal drinks or eats, or when made to walk fast.

The prognosis is grave, in so far as the disease nearly always proves fatal, or at least that its cure is difficult to effect, if it is not simply a modification of simple acute Laryngitis. If it is such a modification its prognosis is less grave, as it is then possible to overcome the disease by rational treatment, or at least to prevent its being an obstacle to fattening.

Treatment.—If it is simple chronic Laryngitis, friction sufficient to raise blisters over the region of the larynx may cause the symptoms to disappear; but it should be frequently resorted to, noticing the following indications: One should make (with tinct. canthar. blisters, or firing irons) one, two, or three applications, sufficient to blister the skin, to straighten the hair, and to raise the epidermis. This done, make no more "applications," as they would be useless or even dangerous; if irritant, they would raise a scar, which is to be avoided; if soothing, they would partly hinder the action of the blisters. If blistering ointment is used it should be applied with a spatula, in such a manner that the preparation may be entirely absorbed by imbibition, otherwise the ointment will roll over parts which one wishes to protect, or on other objects in reach of the patient. In other cases of chronic Laryngitis no treatment will avail.

Editorial.

RABIES REVIVED.

It would appear that we are once more in the middle of an agitation with regard to Rabies, and that attention is again aroused to the danger of having mad dogs running about the streets. It is somewhat painful to witness these periodical scares, which are not without some foundation, and to know that there should be no occasion for them if the central authority who has to deal with the contagious diseases of animals would only exercise the powers which are already possessed, and which, if insufficient for the purpose, can easily be added to, in order to stamp out the scourge throughout the United Kingdom. Notwithstanding all that has been said and written for so many years about the disease, it may be asserted that we are no more free from its dangers now than we were a century ago. Its control is left to the local authorities, who in some places may be very energetic in the measures they adopt, and quite as supine and indifferent in others. Consequently, Rabies is never absent from particular centres, and is always ready to become epizoötic when circumstances favour its recrudescence. The measures for its effectual extinction in these islands have been so often indicated by our profession, and are so well known to the Government, that its continued existence in the land is evidence of gross stupidity or heartless negligence. Not only are the lives of human beings imperilled, and deaths from an agonising malady recorded almost weekly, but dogs themselves and other creatures suffer, while dread of the canine species is engendered. The panics to which Rabies gives rise are the cause of great cruelty to dogs, and serious complaints are made on their behalf, because of the severity of the spasmodic but limited efforts made to suppress its outbreaks. But whenever the panics are allayed no more thought is bestowed on the matter until there is a fresh outbreak, when the same futile local measures, which produce a merely temporary subsidence of the contagion, are enforced; and so the affair goes on year after year, when the three kingdoms, by the operation of general measures which would cause but little inconvenience or hardship to man or beast, might be freed from it in twelve months. In some things we are not a very humane, sensible, or practical people, and Rabies is one of these.

DISCOVERY OF THE PRODUCTION OF IMMUNITY FROM CONTAGIOUS DISEASES BY CHEMICAL SUBSTANCES FORMED DURING BACTERIAL MULTIPLICATION.*

BY DR. D. E. SALMON, U.S. AGRICULTURAL DEPARTMENT, WASHINGTON.

At the meeting of this Association held in Buffalo in August, 1886, I had the honour to read before the Biological Section a paper entitled "Immunity from Contagious Diseases produced by Products of Bacterial Multiplication," and a second paper on "The Theory of Immunity from Contagious

* From the Proceedings of the American Association for the Advancement of Science, vol. xxxvii.

Diseases." In the first of these papers I gave a detailed statement of nine different experiments, in which forty-five pigeons were used. The results of these experiments, demonstrated incontestably that these birds, which were susceptible to the dose of $\frac{1}{4}$ cc. of hog cholera virus, might be made immune from this dose by hypodermic injections of sterilised culture liquid in which the germ of this disease had been previously allowed to multiply.

Nearly a year and a half after the reading of this paper (Dec. 25, 1887), MM. Roux and Chamberland, of Pasteur's laboratory, published a paper in the *Annales de l'Institut Pasteur* in which they gave experiments to show that guinea-pigs may be made immune from the effects of the *Vibrion septique* by inoculation with sterilised culture liquids in which this germ had been allowed to multiply previous to sterilisation. In a foot-note to this paper they say, "At the moment of going to press we read, in the Annual Report of the United States Department of Agriculture, that M. Salmon has succeeded in giving immunity to pigeons from Hog Cholera by injecting into these animals sterilised cultures of the microbe of this disease."

In an article in the *Annales de l'Institut Pasteur* of February 25, 1888, Roux publishes another article, showing that guinea-pigs may be made immune against the virus of symptomatic Anthrax by injections of cultures in which had been grown the *Bacterium chauvœi*, which cultures had afterwards been sterilised by heat. In the same number of this periodical MM. Chantemesse and Widal publish an article on "Immunity against the Virus of Typhoid Fever by Soluble Substances." In this article they make the following statement: "In 1886 Salmon rendered pigeons refractory to Hog Cholera by inoculating with sterilised cultures of the microbe of this disease. The experiment was of little weight (*était peu concluante*), because the pigeon is endowed with a feeble receptivity for this virus, and because the process of vaccination applied to pigs and other mammals completely failed. . . . There was wanting an incontestable experiment which showed immunity given to an animal species very sensitive to the virus by means of soluble substances secreted by this virus. This experiment and this demonstration are found in a memoir that MM. Roux and Chamberland published in the month of December, in the *Annales de l'Institut Pasteur*, on the 'Immunity against Septicæmia.' This work inaugurates a new era in bacteriology."

Hueppe, in an article in the *Fortschritte der Medecin* for April 15, 1888, takes up the history of the investigations of this subject, properly giving credit to my experiments, the first of which were reported conjointly with Dr. Smith before the Biological Society of Washington in February, 1886. He shows that the objection of Chantemesse and Widal is without foundation, because of the check animals used in our experiments.

There is still a determined effort being made, however, by the assistants of Pasteur to secure the credit of this discovery for the Pasteur laboratory. In a review of my investigations of Hog Cholera written by Duclaux, and published in the *Annales de l'Institut Pasteur* for July 25, 1888, the subject is again taken up, and a laboured effort made to show that my experiments were not conclusive. M. Duclaux begins his review by saying, "The works of M. Salmon on Hog Cholera are scarcely known in France, and appear to be known little better to the European public. There are two reasons for this. The first is that they have been published in an official report not found in commerce, and the copies which reach Europe generally go to be buried in the tomb of the ministerial archives, or in the grand mausoleums hostile to visitors that we name, in France, public libraries. The other reason, more personal to the author, is that he proceeds too much by that method of exposition which consists in pouring on the head of the reader the entire contents of his notes of researches, leaving him to make his choice among the materials which thus reach him without order and without measure. . . .

As I said in the beginning, they are not known in Europe, where they scarcely figure in the journals until after the tardy communication which was made in 1887 by MM. Salmon and Smith to the Washington congress. But had they been known sooner, they would not have been sufficient to rally the then hesitating opinion on the subject of vaccination by soluble substances. They exposed the flank too much to very legitimate objections."

Before considering the objection raised by Duclaux to the experiments themselves, I desire to call the attention of the Association to certain publications in which these experiments were referred to at considerable length prior to the meeting of the International Medical Congress at Washington. The first communication was read before the Biological Society of Washington, Feb. 20, 1886, and printed in volume iii. of the Proceedings. This paper was printed in full in the *American Veterinary Review* for May, 1886, and it was referred to at considerable length in an editorial printed in the *New York Medical Journal* of March 6, 1886. This paper contained our first experiments with sterilised culture liquids, and in it was given the demonstration of the principle, that immunity may be produced by the injection of soluble substances which result from the growth of pathogenic bacteria. The paper was confined to one topic, was concisely written, and occupied less than five pages, and consequently is hardly open to the criticism of M. Duclaux. The paper read before the American Association for the Advancement of Science in August, 1886, was printed in full in the Proceedings for that year, p. 258, and was also printed in the *Medical News* of September 18, 1886. It appears to me, therefore, that if the scientists connected with M. Pasteur's laboratory were ignorant of these investigations until after the meeting of the International Medical Congress in September, 1887, it is not because the literature was inaccessible.

MM. Chantemesse and Widal take exceptions to my experiments because pigeons, which were the animals used, were but slightly susceptible to the virus, and because this process of vaccination applied to hogs and other mammals had completely failed. It is somewhat amusing to find in the same number of the *Annales* a communication from M. Roux, of M. Pasteur's laboratory, claiming to demonstrate that immunity can be produced from *Charbon symptomatique* with soluble substances, and in which the investigation was made by experiments with animals even more insusceptible to this virus than were pigeons to the virus of Hog Cholera. Roux used guinea-pigs, and he tells us that " cattle and sheep are the animals that most easily take the *Charbon bactérien*. The guinea-pig shows more resistance to this disease; it does not always die as the result of inoculation made with the pulp of the charbonous tumour. MM. Arloing, Cornevin and Thomas have made known a mode of inoculation which always produces death to guinea-pigs. To obtain this result it is sufficient to mix the virus with a solution containing twenty per cent. of lactic acid. With this means of proof there need be no fear of a failure of the inoculations or of seeing the control guinea-pigs resist them."

It is a rather peculiar idea to advance that we must receive without question experiments made in Pasteur's laboratory with animals so insusceptible that a foreign substance must be added to the virus in order to produce positive results, while exactly similar experiments must be rejected, when made in this country with virus to which it is not necessary to add any foreign substance, and which, under the conditions mentioned, never failed to produce positive results. This objection was apparently disposed of by Hueppe, however, when he called attention to the control experiments and the positive results of these inoculations.

The question is, however, apparently deemed of too much importance to Pasteur's laboratory to be allowed to rest here. In Duclaux' review a new

objection is relied upon to show that my experiments were valueless. It is that the liquids were sterilised at a temperature too near to the limit at which the microbe is destroyed. Duclaux claims that testing this liquid by adding a few drops to a fresh culture tube, in order to learn whether there are any living organisms present, proves nothing. "It was known," he goes on to say, "and it is still better known now, that microbes which are present in a culture are not identical, and that they have different powers of resistance to external agents. These powers of resistance are not identical, although approaching each other closely, and the more closely the more homogeneous the culture. Nothing proved then, and nothing proves yet, that all of the microbes were killed at this temperature limit of 58°-60°."

These objections were anticipated when our experiments were planned, and any one who will go carefully into the details of these experiments will see that the objections do not hold good. It is true that the temperature of 58°-60°, at which we sterilised our culture liquids, is rather near to the limit which is necessary to destroy all life in these cultures. While admitting that there may be different degrees of resistance with this germ, however, we demonstrated that 58° maintained for ten minutes was sufficient to destroy those germs with the greatest powers of resistance, because none were left capable of multiplying after they had been so treated. In our experiments on immunity we do not limit the cultures to a temperature of 58° for ten minutes; on the contrary, we increased the temperature one or two degrees, and we maintained this increased temperature for two hours—in other words, for twelve times as long as had been found necessary to destroy all living germs. It will also be seen, by reference to the details of our experiments, that in some of these the culture liquids employed were concentrated over a water-bath. In these experiments the culture liquids were heated to a temperature of nearly 100° for from one to two hours. This is far beyond the point where there could be any doubt of the germs being completely destroyed. While some of the experiments in which this evaporated virus was used were successful, we recognised the fact, apparently confirmed by the French investigations, that such a temperature weakened the power of the liquid for the production of immunity. We consider, therefore, that this objection of Roux is absolutely untenable, and that there can be no question that the virus was completely sterilised in our experiments.

As another reason for his belief, Roux cites the small quantity of sterilised culture which was sufficient to produce immunity. "Thus," he says, "in the first of these experiments published in the Report of 1885, a dose of $\frac{1}{10}$ cc. of vaccinal culture sufficed to confer almost complete immunity on a pigeon. This dose differs greatly from that which is necessary to confer immunity in other diseases." Roux evidently errs in this statement. By referring to the Report of 1885 it will be found that one pigeon received $\frac{5}{10}$ cc., and when inoculated with strong virus died in forty-eight hours, *i.e.*, this bird had no immunity whatever. Another one received 1·5 cc., and when inoculated with active virus was so affected that it lost the use of its legs, although it survived the inoculation. In this case there was evidently a partial immunity. All of the other birds referred to in that Report received over 3 cc. In our subsequent experiments we found that 2 cc. would generally confer immunity on pigeons, although in many experiments we used 3 to 4 cc.

When we turn to the experiments made in Pasteur's laboratory we find that this quantity is not so different from what was used there as we should be led to believe from the remarks quoted. For instance, while in the experiments of Roux and Chamberland, for producing immunity in guinea-pigs against the *Vibrion septique*, they used 120 cc. of culture liquid which had been heated to 105°-110°, they succeeded in producing equal immunity with doses of only 1 cc. of the serum from the muscles and cellular tissue,

which was sterilised by filtration instead of by heat. It would appear that the high temperature which they used for sterilising their culture liquids destroyed to a certain extent the activity of the substance which produced immunity, just as in our experiments a still lower temperature had such an effect. If doses of 1 cc. of filtered serum, repeated seven or eight times, are sufficient to produce immunity in an animal of the size of a guinea-pig, which weighs from 400 to 500 grammes, it is not surprising that an equal dose of sterilised culture liquid, repeated twice, should be sufficient to produce immunity in a pigeon which only weighs from 200 to 250 grammes. Roux also succeeded in producing immunity in guinea-pigs against symptomatic Charbon by doses of 1 cc. of filtered serum repeated from ten to twelve times. With these experiments before him we are surprised that Duclaux should raise this objection as to the size of the doses of sterilised culture used in our experiments.

The final objection raised by Duclaux is that this method of vaccination had failed with the more susceptible animal species; that it succeeded only with the pigeon, a species on the marginal line of immunity; and that this mode of vaccination succeeded better in winter than in summer, and that even in winter there are some failures. It is true that our experiments failed with large animals like pigs, which are more susceptible to the disease, but this has no bearing on the demonstration of the principle. With these large animals, and especially in this disease, there are other difficulties to be overcome. The large size of the animal requires a great increase in the amount of the material used, an amount for the determination of which sufficient experiments have not been made. Again, the manner in which the virus is introduced into the body under natural conditions has a very important influence. Indeed, it is doubtful if the immunity of pigs can be artificially raised to such a degree as to prevent the multiplication of the germs on the mucous surface and within the walls of the intestines, and the formation of those large ulcers which are characteristic of the malady and are usually fatal. It is not to be forgotten that M. Roux has not published any experiments in which he has succeeded by this method in conferring immunity on cattle or sheep against symptomatic Anthrax; but I have not heard of this being urged as an objection to the conclusions from the experiments on immunity with guinea-pigs which he has published.

Duclaux is wrong in supposing that our experiments only succeeded with pigeons in winter. We did not make this statement. Pigeons are more susceptible to the virus of Hog Cholera in winter than in summer; consequently we selected winter for the experiments, because at that time our control experiments with unprotected birds were successful. It is true that some of our experiments failed, but I imagine no principle has been worked out experimentally in which all the experiments from the beginning were successful. It was necessary for us to determine experimentally the dose which was to be given to produce immunity and the number of times it was necessary to repeat the dose. We also endeavoured to learn the effect of a boiling temperature on the soluble substances produced in the cultures of this germ, and the high degree of heat is responsible for the failure of some of the experiments. It also required some experimenting to learn that pigeons are more susceptible in winter than in summer. We published all of our experiments. M. Roux avoids the charge of failure by publishing only successful experiments. Taking all these facts into consideration, it must be admitted that our experiments published in 1886 were successful, and that they demonstrated the production of immunity by soluble substances contained in the culture liquids in which the germ of Hog Cholera had multiplied. I therefore continue to claim priority for this important discovery.

TUBERCULOUS FLESH.

AFTER a long and patient investigation in Glasgow by Sheriff Berry, and the examination of many medical men and veterinary surgeons, with regard to the question whether or not the flesh of cattle affected with Tuberculosis in any degree was fit for human food, the Sheriff has decided that such flesh should not be offered for consumption. The inquiry was instituted at the instance of the Local Authority, who had taken proceedings against two meat salesmen for exposing such flesh for sale. All the veterinary surgeons were in favour of the interdiction of the flesh of tuberculous cattle as food, and only two or three medical men asserted that it might be so utilised.

HORSE SYPHILIS OR MALADIE DU COÏT.*

BY W. L. WILLIAMS, V.S., ILLINOIS, UNITED STATES.

I HEREWITH submit my report upon the outbreak of Equine Syphilis, Maladie du Coït, or malignant Venereal Disease of Solipeds, which has been lately brought to notice in De Witt County, Illinois.

This being the first well-authenticated outbreak of this disease, so far as known, in any English-speaking country, renders a thoroughly complete and accurate report both difficult and desirable, the English veterinary literature upon this subject being practically all translations from foreign languages, and in most cases very meagre in detail and inaccurate in many important particulars. From such as exist, however, I have not hesitated to draw freely whatever seemed of value, and acknowledge with pleasure the assistance derived from Dr. Fleming's very able and exhaustive treatise in his "Veterinary Sanitary Science and Police," from which, although differing radically from him in some important particulars, I have not hesitated to copy or condense the general history of the disease and his table of synonyms, and in nearly every part of the work have freely drawn whatever seemed of value to my purpose.

I acknowledge also with pleasure many kind and valuable suggestions regarding the work by Professor Law and Dr. Casewell.

SYNONYMS.—Technical: *Lues Venerea Equis, Framboesia Morbus Pustulosus*, etc. French: *Maladie du Coït, Maladie vénérienne des Solipedes, Maladie paralytique du Cheval, Paralysie Epizoötique, Paraplegie Epizoötique, Morve de l'Appareil de la Generation*, etc. German: *Exzemausschlag, Chankerkrankheit, Gutartige Beschälkrankheit, Bosartige Beschälkrankheit, Pseudo-syphilis*, etc. Arabic: *El Dourine, Dourine* (Fleming).

HISTORY AND GEOGRAPHICAL DISTRIBUTION.

The earliest account of the disease known is that by the German veterinarian Ammon, who witnessed it in 1796 and 1799, amongst stallions and mares in Trakehnen, North Prussia, where it persisted until 1801, and reappeared six years later; but the disease was probably known at a much earlier date in Southern Russia. It appeared in Austria in 1815, and in Hanover in 1816, where it spread and prevailed until 1820-21. In 1821 it appeared in Syria and Silesia, reappearing in the latter country in 1826.

From 1827 to 1830 it caused great mortality in Bohemia, and in 1830 the

*"Report on the Outbreak in Illinois, to the State Board of Live stock Commissioners," reprinted from the *American Veterinary Review*.

disease appeared in Berne, Switzerland. From 1833 to 1836 the disease raged in Upper Silesia, and again in the same province in 1840-41. Horse-breeders had now become so thoroughly alarmed that careful investigation by veterinarians and severe legislative enactments soon checked the ravages of the disease in Germany.

In 1847 Signol saw the disease in Algeria, where it caused a loss of 600 horses, and other writers mention the occasional appearance of the disease in the North African States.

In the spring of 1851 the disease broke out for the first time in France, in 31 communes around Tarbes, containing 1,874 mares, and out of 750 mares bred to government stallions 100 became diseased, and an additional 27 mares became diseaséd by private stallions; 52 of the affected mares died, and the disease almost entirely disappeared during the following year, only to reappear in 1856, 1857, 1858, and 1861. The disease was directly traced to stallions imported from infected countries in 1851 and 1861.

"This is, as far as I can trace it, the geographical limit of this curious disease. It has not been witnessed as yet in England, Belgium, Italy, Spain, or Denmark, nor in countries beyond Europe, Asia, or Africa, so far as I am aware, but there can be no doubt but that if diseased stallions or mares are imported to those regions now exempted from its effects it will appear there, as it has done in Russia, where it is frequent and violent, particularly in the southern governments—Germany, Hungary, Bohemia, and France." The above history, abbreviated or quoted from Fleming, demonstrates to some extent the serious nature of the malady, the probable source of the disease in America, and the importance of dealing with it in a prompt and decisive manner.

The History of the Disease in De Witt County, Illinois,

and its source of origin, were for a long time somewhat obscure, but now seem reasonably clear. Three sources of origin have been suggested. *First*, it was supposed that the disease was introduced direct from France by Harrold and Culbertson, of Wapella, in January, 1884, when they imported nineteen French draft stallions, aged from eighteen to thirty months, all of good quality and showing no evident sign of disease.

In 1884 one died from injuries in transit, and three were sold, which, so far as can be learned, remained free from the disease. In 1885 one died from unknown cause, and one was sold to parties who in turn sold him to W. R. Carle, of Wapella (No. VIII),* and two (XII and XIII) were sold to Foley and Seniff, of Wapella.

In 1886 two horses died, one probably of venereal disease, the other from unknown causes, and two were sold to California parties, which are reported well.

In 1887 there remained seven horses, six of which were used on the Harrold and Culbertson farm, and all badly diseased, while the seventh horse was used for stud purposes at Danvers, Ill., and remains sound.

In April, 1884, Harrold and Culbertson brought from Texas 236 select western horses, about 170 of which were pregnant mares, which afterwards dropped and reared healthy foals.

These mares were then bred promiscuously to such stallions as were on hand in the years 1884 and 1885; nearly all the mares were impregnated and dropped healthy foals, which remain on the farm. In addition to these mares, the stallions were allowed to serve such outside mares as were offered. No signs of disease were noticed in 1884, but in 1885 it would

* Numbers refer to tabulated list of affected and exposed stallions and mares.

appear that at least one outside mare, and probably a few on the farm, developed the disease, but being wholly unheard of and unexpected, no special notice was taken of it until the spring of 1886, when the disease assumed such alarming proportions in both mares and stallions that all breeding was discontinued on the Harrold and Culbertson farm. The objections to this theory of origin are, 1st, the stallions were too young to have been used extensively for stud purposes, and hence unlikely to have been affected prior to importation; 2nd, with the exception of VIII, XII, and XIII, which were kept in the neighbourhood, all stallions sold from the farm have, so far as known, remained healthy; 3rd, they made the season of 1884, serving promiscuously a large number of mares without producing the disease, and again in 1885 without affecting a sufficient number of mares to cause alarm.

A second theory of origin is by means of Texas mares, either from having been affected upon their arrival or generating the disease spontaneously by haphazard copulation.

Spontaneous origin being wholly unknown in other specific contagious diseases and the past history of Equine Syphilis in other countries, where it has always been traced to the importation of breeding animals from an affected district, should prove sufficient to dismiss the idea of spontaneity, while the fact that the disease, so far as can be learned, is wholly unknown in Texas, and that all Texas mares brought to De Witt County were doubtless well until after being bred to affected stallions, should set at rest this theory of origin.

The third and most tangible theory is that the disease was introduced direct from France, by the imported brown "Moore" horse (No. XV), now owned by J. Fisher, Clinton, Ill., imported in 1882 by Benson and Knapp, Monticello, Ill., at the age of three years, sold in spring of 1883 to Moore and Son, Clinton, Ill., and by them was placed in the stud near Clinton, serving a large number of mares besides those belonging to his owners, a fair percentage of which became impregnated and dropped healthy foals. In 1884 he was continued for a time in the stud without any complaint from patrons, but before the season was far advanced the horse became unwell. The genital organs became swollen and the penis sore in several places. At the ring of the penis (preputial ring) there was sufficient ulceration to destroy the ring at the front part. At the upper part of each flank there were extensive ulcerating sores, which healed tardily, leaving large unsightly scars. On the left side of the crest of the neck there appears a very plain brand, of the letters "D N," which I am reliably informed by Prof. Law and Dr. P. Paquin unmistakably indicates that this horse had been condemned by the French veterinary authorities for Maladie du Coït. The horse was sold, some time after the development of the symptoms of disease, for a merely nominal sum, as a seriously diseased stallion, to his present owners, after having been taken from the stud and treated for his malady with indifferent results, and in 1886 and 1887 the horse's services were offered to owners of mares, but only a limited patronage was obtained. Nothing particularly further was thought of the matter until the disease broke out in alarming proportions, and inquiry was instituted to determine its origin, when it was learned that in 1883 Milton Chapin bred two black mares to the Moore horse, and disposed of one to Sandusky Wilson, and the two mares were bred in 1884 to Utopia (XII) before he was sold to Foley and Seniff. It is now said that one or both of these mares were affected with Equine Syphilis when bred to Utopia, and that they had contracted the disease from the Moore horse in 1883. Certain it is that the Wilson mare was bred to the Moore horse in 1883, and to Utopia in 1884, and that she was seriously diseased in 1884, undoubtedly of Equine Syphilis, partially recovered, was sold to a Mr. Yakle, of Waynes-

ville, Ill., and by him to an unknown shipper. The other Chapin mare was traded to itinerant horse-traders, and was soon lost sight of, but being at that time twenty years old, or more, it is probable that she is ere this dead.

Returning, then, to Utopia, after having served the Chapin and Wilson mares, he was kept in stud by Harrold and Culbertson, serving among others the "Marvel" mare (No. 383), and was sold apparently sound, in March, 1885, to Foley and Seniff, and proving unequal to the demand, Black Brilliant (XIII) was purchased of Harold and Culbertson to assist, and he proving unsatisfactory, was exchanged, June, 1886, for Perie (III).

During the summer of 1885 Utopia served about sixty mares, without, so far as learned, diseasing any, and in the fall of 1885 he served some twenty mares, of which a few proved in foal, while some fifteen of them became affected, nine of which have died, and the others have mostly partially recovered, some of them scarcely showing any trace of the disease.

Here matters were allowed to rest apparently quiet until early in April, 1886, when the disease had assumed such alarming proportions in Wilson township that Messrs. Foley and Seniff asked me to see their stallions and some of the affected mares and advise with them as to the proper course to pursue. I examined six or eight mares affected since the fall of 1885, all exhibiting the constitutional symptoms of the disease as hereafter described.

The two stallions were carefully examined, Black Brilliant (XIII) appearing perfectly sound, and Utopia (XII) well except a slight swelling and redness of the urethral opening in penis and a slight dirty-brownish watery discharge from the urethra, which might occur in any stallion without attracting special notice. Not being fully aware of the extremely insidious, misleading, and serious nature of the disease with which I had to cope, and hoping that the disease could be successfully confined to its then apparent narrow scope, I advised that Utopia should be withdrawn from the stud until all symptoms of disease should disappear, prescribed such treatment as I thought best for both mares and stallion, and as the other stallion (Black Brilliant) exhibited no signs of disease, I advised that he be continued in the stud. The affected animals apparently improved for a time, and I saw them once more in April, at which time I made some immaterial changes in the treatment; and here my personal observation of the disease ended until renewed by your directions in May of the present year. My second visit, in April, 1886, brought me to a more full realisation of the dangers to our horse-breeding interests from this disease, and accordingly I reported the matter briefly to you under date of May 1st, 1886.

Verbal reports of the spread of the disease in De Witt County reached me occasionally during the summer and fall of 1896, until early in 1887 the accounts became so alarming that I reported the matter more fully to you and urged decisive action.

Returning to the Harold and Culbertson farm at the date of sale of Utopia to Foley and Seniff, it seems that Utopia previous to his sale had infected some mares without attracting the attention of the owners, which in their turn transmitted the disease to other stallions, and thus the malady continued to spread, unobserved in 1884, suspected in the autumn of 1885, and asserting itself positively in 1886.

The totally unknown and unsuspected nature of the affection, with its long periods of incubation, latency, and want of such pronounced symptoms in its earlier stages as we usually expect in a deadly contagious disease, readily allowed it to gain a disastrous hold unobserved, or at least unrecognised.

Previous to the general recognition of the dangerous character of the

disease the usual traffic in horses went on uninterrupted, so that a number of exposed mares, and certainly two or three diseased mares, were disposed of ere the public was aware; but fortunately it seems that only a very few of actually diseased mares changed hands, and nearly all of these have been found and safely quarantined, and the others traced to dealers' hands, from whence in all probability they went to our large cities or northern pineries for draft work, where they are not likely to ever again be bred. But some of the affected mares were unfortunately bred to neighbouring healthy stallions, and in this way the disease was communicated to XVIII by a mare bred early in 1886 to XII-XIII, by Henry Bell, of Wilson township, and to XVII by a mare bred by N. Foley in fall of 1885 to XII-XIII, and afterwards sold to Kelly and Waters, and by them bred to XVII in 1886 and 1887. Were it possible to trace the history of every affected animal, we should doubtless find all cases emanating from one source of origin; and from the evidence now at hand it would seem that the most probable source of origin of the present outbreak is the Moore horse (XV). Bearing in mind the history of the disease in the old world, we should naturally look to some imported animal for our source of infection; and since practically the only horses we import from a country known to be infected are those from France, we should consequently expect to trace the disease either directly or indirectly to that country.

Character.—There exist almost as many definitions for Equine Syphilis as there are different writers upon the subject.

The name Maladie du Coït signifies merely that it is a disease contracted by copulation, while in fact there is at least one other venereal affection of solipeds (horse, ass, etc.), which might as properly be termed Maladie du Coït as this disease.

English writers translating from German, French, and other foreign languages, refer to a benignant and a malignant form of the disease, but from my experience with venereal diseases of horses in the past, as well as from observations in the present outbreak, I am obliged to take exception to the generally accepted ideas of English writers and translators, and separate the so-called benign form from the disease under consideration as a wholly distinct venereal disorder, the reason for which I shall more fully allude to later, and we therefore prefer to discard the term Maladie du Coït, and follow the nomenclature of writers of human medicine, denominating the fatal constitutional disease under consideration Equine Syphilis, resembling closely, as it does, the Syphilis of man, and applying the name Equine Chancre or Chancroid to the benign, local, eruptive venereal disorder which closely resembles the soft or non-syphilitic Chancre or Chancroid of man in many of its characteristics. From the above standpoint, then, Equine Syphilis may be defined as a malignant, specific venereal disease, peculiar to solipeds.

The nature of the disease is not thoroughly understood, some believing it to be a neurotic (nervous) affection, while others, noting the very common changes in the lymphatics, designate it a lymphatico-nervous disease, etc. Others, relying on some similarity of symptoms and pathological changes, believe it identical with or closely allied to human Syphilis. But the mercurial treatment so efficacious in the Syphilis of man seems inert in this disease; the symptoms of the two disorders, while resembling each other in some respects, yet differ widely in many very essential particulars, and furthermore, carefully conducted experiments of Horand and Peuch, of Lyons, demonstrate that human Syphilis is not transmissible to solipeds.

"Without entering, then, into any further discussion of the views entertained with regard to the nature of the disease, we may at once aver that no definite conclusion can be arrived at, and we must be content with the state-

ment that it is an eminently virulent malady of specific nature, generally marked at first by local signs, and subsequently by constitutional derangement of a grave character" (Fleming).

Causes.—Various authors propound diverse theories as to the primary cause or causes of the disease, but each fails to produce a tangible origin. Amongst the proposed causes may be mentioned atmospheric conditions, faulty hygiene or dirt, too frequent copulation or too frequent sexual excitement without sexual contact, crossing of breeds, vaginal catarrh in the mare, etc. But these influences have existed as long in countries where the disease is unknown as in those where it has prevailed for nearly a century or more, without producing the disease.

Others have imagined its cause to be the fornication or bestiality of Syphilitic men with the female ass, as is doubtless practised by Arabs, in the belief that this bestiality will cure them of their malady, and thence from the ass to the horse by copulation; but against this theory stands the objection already mentioned, that human Syphilis is not transmissible to solipeds.

Symptomatology.—Holding that the so-called benign form of the disease, as described by English authors, is a wholly distinct venereal disorder, there is no necessity for detailing here the symptoms of this affection, but I will follow the description of their so-called malignant form, noting such differences as may have presented themselves in the present outbreak. It may be stated, however, that in the so-called benignant form authors describe essentially the same local symptoms as in their malignant type, but assert that these symptoms remain purely local, and are followed by recovery in two to eight weeks.

Symptoms in the Mare.—In a variable length of time after copulation, usually eight or nine days, the mare exhibits uterine excitement resembling exaggerated œstrum (heat), the vulva becomes swollen, the mucous membrane of the vulva and vagina is reddened, and there is a vaginal discharge of at first a serous nature, which soon increases, becomes thicker, sticky, viscid, and white, yellow, greyish, or reddish in colour, which collects about and soils the tail and perinæum.

The mare is restless, as evinced by occasional stamping with the hind feet. The urine is voided frequently, in small quantities, its passage irritating the already congested or inflamed vaginal mucous membrane, causing increased restlessness. The vaginal mucous membrane continues to grow more irritable, and the colour becomes a deeper red. The lips of the vulva become more distinctly swollen, the swelling being of an œdematous (dropsical) nature.

Eruptions.—"At this time there appears on the mucous membrane of the vagina, vulva, and clitoris small miliary pustules, which soon become little superficial ulcers, no more than one-fifth of an inch in diameter. These ulcers are not long in cicatrising, but they are replaced by others, which, like the first crop, are most numerous in the fossa navicularis, on the clitoris, and near the margin of the vulva; the symptoms are intermittent, disappearing for some days and again manifesting themselves, in the majority of cases becoming milder, until they finally disappear" (Fleming).

Unfortunately, we have not enjoyed the privilege of seeing cases of less than several weeks' standing, but in none of these have we seen the pustules and ulcers above described, nor have we noticed any changes or appearances in the parts that would suggest the prior existence of such eruptions, neither can we learn from the many intelligent horse-breeders who have had abundant opportunities for close observation that such eruptions have occurred to that marked extent described by Fleming and others in the present outbreak; and since Fleming, as previously quoted, describes these pustules and

ulcers as occurring more particularly in the so-called benign form, we may well doubt, if not wholly deny, the occurrence to any marked extent of any such eruptions in the affection under consideration, especially when we remember that such eruptions do occur in abundance in the benign venereal disease, with which English authors so hopelessly mix the true Equine Syphilis.

If any eruptions at all have occurred in the present outbreak, they have been entirely within the vagina, very few in number, and of very brief existence, and not generally noticeable to an ordinarily close observer.

The swelling of the lips of the vulva is intermittent and variable, extending sometimes downwards along the perinæum to the mammary region (udder), and is occasionally more marked in one lip of the vulva than in the other giving it a deformed appearance. The mucous membrane of the vagina is red, swollen, and wrinkled, appearing unnaturally rough to the eye. English writers describe the frequent occurrence, on the external surface of the lips of the vulva, on the perinæum and inner face of the thighs, of lenticular pustules, succeeded by readily healing ulcers, but no such eruptions have occurred in the present outbreak.

There does occur, however, in a large proportion of cases, a peculiar loss of pigment in the skin of the vulva, perinæum, and anus, beginning usually in spots of variable size and shape, gradually enlarging and coalescing until the entire vulva, perinæum, and anus may be one continuous white patch, with irregular border, or dotted over with white spots varying from one-fourth to one inch or more in diameter. The vaginal discharge may vary greatly in amount, and may cease after a few months, or may persist for a year or more, is usually dirty white or greyish in colour, frequently possesses an offensive odour, becomes viscid and glutinous, adhering to and irritating or excoriating the adjacent parts.

Coitus increases the vaginal discharge, as well as aggravates in every way the symptoms of the disease. In many cases there is a marked loss of power in the vulva and vagina, causing an involuntary discharge of accumulated matter from the vagina during sudden exercise.

Incontinence of urine has been noted in a well-marked case of fifteen months' standing, which, added to the catarrhal discharge, and adhering to the tail and thighs, made a very repulsive sight.

The most constant and persistent symptoms noted in the present outbreak are the changes in the vulva and clitoris.

The margins of the vulva lips lose their black pigment early in the disease, and it is not replaced until after the white spots on the external parts of the vulva, on anus, perinæum, and under side of tail have wholly disappeared, which usually occurs after six or eight months. The vulva shows a marked tendency to gape, especially at its lower commissure, due partly, doubtless, to a loss of power in the vulva itself, but mainly to the enlarged clitoris pushing the lips apart, this gaping giving the appearance of extreme age to a young mare. The clitoris is quite uniformly enlarged, exhibiting a smooth, shining surface, wholly devoid of pigment and unnaturally dry, there appearing to be a destruction of the mucus-secreting glands of the clitoris and fossa navicularis, or at least a temporary destruction of their secreting power.

Infected mares rarely conceive, and the few that do almost invariably abort by the sixth month, and in case the foal is carried to the full period it is almost sure to be weakly and short-lived. There is frequently considerable pruritis (itching), as evinced by rubbing of the tail and hinder parts and licking or biting various parts of the body. Comparatively early in the course of the disease there are frequent œdematous swellings of the legs and abdomen.

The inguinal glands may enlarge and even suppurate, and the mammæ (udder) occasionally enflame and enlarge. Enlargement of the submaxillary glands (the glands between the angles of the lower jaw) is frequently present, and in some cases there is seen a viscid, sticky discharge from the nostrils, closely resembling Glanders, which resemblance is heightened by the appearance on the nasal membrane of small superficial erosions or ulcers, and usually associated with the nasal discharge there is observed also a mucupurulent discharge from the eyes.

In the present outbreak, as in those described by German writers, there occurred frequently, suddenly appearing, sharply defined, circular or various-shaped flattened swellings, one, two, or even six or seven inches in diameter, hard and unyielding to the touch, sometimes painful upon manipulation, at other times causing pruritis, as is indicated by the animal licking or biting at the affected parts. These swellings may appear at any time from eight to ten weeks to the end of the disease, and may disappear as suddenly as they came, and others may appear in other parts of the body. In nearly all cases, as the disease progresses, there appear signs of weakness and paralysis, mainly of the hinder parts, at first exhibiting an unsteady gait, the animal bringing the hind feet forward in a difficult, uncertain manner, usually dragging the toes along the ground, or at least striking the ground at the middle of the stride, and in bringing the foot to the ground placing the toe down first, with the fetlock flexed, which is then extended suddenly as the heel is brought down. This imperfect action may be seen in one or both hind limbs, or may appear first in one, then in the other, then in both, persist for a few days, then disappear entirely, or nearly so, and then return again worse than ever.

Sometimes this lameness is of a spasmodic nature, somewhat resembling Stringhalt, the hocks being suddenly flexed and carried forward with a jerk. As the disease advances the lameness usually increases, the back becomes arched, and the hind feet are dragged along the ground, until finally the paralysis becomes so severe that the animal is unable to rise when down, and in their struggles to get up it is said that fractures sometimes occur in the bones of the loins or hips. Emaciation usually begins early in the disease, and increases rapidly when the paralytic symptoms develop, until the animal soon presents a hideous sight, the whole body being wasted to a mere skeleton, in spite of the fact that the appetite remains unimpaired to the last, and the food appears to be well digested. Late in the course of the disease there is occasionally seen paralysis of a lip or an ear.

Death may be due to a gradual giving way of the animal powers from the extreme marasmus, or to pneumonia, or other accidental complications.

In the Stallion

the general symptoms are essentially the same as in the mare, so we shall need mainly to consider the local manifestations of the disease in the genital organs. Its commencement is far more insidious in the stallion than in the mare, being in many cases wholly unrecognisable for months. Sometimes the symptoms appear early, while in other cases the development of the disease is tardy, and apparently unnoticeable; or the primary symptoms may appear for a few days or weeks, then disappear entirely, and the stallion remain apparently well for months, although he is returned to the stud (which doubtless aggravates the disease), and yet be capable of transmitting the malady at least six months later, probably several years, without affording other evidence of disease. Usually the first noticeable sign of disease is a well-marked peculiar swelling of the prepuce, of an indolent, doughy nature, which may extend forward to and implicate the anterior part of the sheath,

and backward to and including the scrotum, the skin being thickened, smooth, and shining. These symptoms may disappear entirely in a few days to a few weeks, and leave no tangible trace of the disease, except the power of transmitting it to other animals, or it may remain for some months or years, either to be complicated with, or succeeded by, other symptoms.

It may be, as stated by most writers, that some stallions do not develop these primary tumefactions, but there is certainly good reason to suspect that, in many of the extremely occult cases these primary symptoms *did* appear at first, but were attributed to accidental local injuries, such as often occur, passed almost unnoticed, and were soon forgotten by the attendant; months go by, and the stallion resumes his work the following year, only to transmit the disease to some of the mares he serves, or by excitement of copulation to develop the characteristic signs of the disease. At this early stage of the disease, most writers, but not all, describe erosions and eruptions upon the prepuce, penis, and sheath, and some eruptions are said to have been seen in the present outbreak, but they were of a very insignificant character, few in number, no successive crops, and all disappearing quickly, leaving no noticeable scar. In most cases no erosions or eruptions were noticed at all, and in others they were probably due, to a great extent, to accidental abrasions, or erosions due to contact of the discharge from the urethra with the eroded parts, which were usually the penis and prepuce about the preputial ring.

The sheath may or may not become swollen, the swelling may disappear early, or may persist throughout the disease, the swelling when present varying in size, susceptible to unaccountable turns of growth or subsidence, and partaking of the same peculiar indolent character as the swellings of the prepuce, or may be indurated and hard from the presence of suppurating lymphatic glands.

The testicles are in most cases unusually pendent, from paralysis of the cremastic muscle, but in some cases they lie close against the external ring, when greatly atrophied, or may even be pushed up into the ring by abscesses or indurations of the lower part of the scrotum. In size they may be normal, enlarged, or atrophied. In the earlier stages enlargement is probably the rule, but in the later stages atrophy is almost constant, and when apparent enlargement does occur it is generally due, not to enlargement of the testicle proper (*parenchyma*), but to a thickening of the coverings of the testicle. In consistency the testicles are almost always soft and flabby, with an indefinite contour when manipulated.

The penis is said to be sometimes hypertrophied (enlarged), and sometimes atrophied (wasted), but in the present outbreak no marked deviation from the normal size has been noted. Writers also generally mention that in some cases the mucous membrane of the penis may be unnaturally red, or be the seat of bluish or violet elliptical patches, or of yellowish-white marks, probably the result of pre-existent eruptions, none of which have been noted in the present outbreak. In a large proportion of cases there is a loss of retractile power in the penis, so that it usually hangs partly out of the sheath, in the prepuce, or in extreme cases it may hang at full length entirely out of the prepuce, wholly powerless.

The sexual desire usually remains unimpaired throughout the disease, and in many animals the power to copulate is but little impaired, but in the earlier stages, during the tumefaction of prepuce and penis, either from excessive erection or other cause, the stallion fails in many cases to effect coition, and late in the course of the disease the same inability may arise from loss of power in the penis, or from the extreme paralysis of the posterior parts.

The urethral opening may be normal or abnormally red and swollen and

in some cases there is a muco-purulent discharge from the urethra, while in others there are occasional involuntary emissions of semen, mixed with mucus and pus, containing a few dead or very inert spermatozoa. *Urination* is usually frequent and attended with some pain, and the urine may vary from normal to thick, yellowish, viscid, etc., or be mixed with mucus or pus from the urethra. In some cases polyuria or diabetes is well marked.

Emaciation, with dry, staring coat, is noted in a majority of cases as the malady advances, but is not uniformly seen, and is usually of a more or less intermittent character, progressing rapidly for a time, then halting, perhaps improving, when the emaciation again sets in with increased virulence, being especially marked in the hind quarters. The symptoms of paralysis and intermittent lameness in the posterior parts appear much the same as in the mare. There is a swaying, unsteady gait, as if the loins were affected, lameness in one or both hind legs, and a jerky, string halt-like gait.

Some authors mention that in some cases there appear peculiar epileptiform convulsions in the stallion when approached by a mare, in which the stallion is seized with spasmodic trembling, rigidity of the muscles of the neck, convulsive shaking of the head, dilatation of the eyes and nostrils, rolling of eyeballs, etc. In one stallion (VIII) there was a marked loss of voice, an excessively glutinous nasal discharge, large nodulated submaxillary lymphatic glands, and distinct superficial erosions on the nasal mucous membrane.

Pruritis is usually more marked in the stallion than in the mare, causing him to rub or bite violently the feet, pasterns, or other affected parts, producing large, unhealthy sores. The elliptical welt-like swellings of the skin are usually also more marked in the stallion than in the mare. There is also a strong tendency to suppuration of the inguinal and scrotal lymphatic glands. The inguinal glands, in some cases in the present outbreak, were the seat of extraordinarily large abscesses, in some cases filling up the entire groin and causing excessive swelling of the scrotum, extending down almost to the hock joints, and when the abscesses finally ruptured they discharged near a gallon of thick, curdled pus. The lymphatics of the sheath and scrotum were still more prone to suppuration, but the abscesses were tardy, indolent, and usually not very extensive, but their presence frequently caused extensive indurations, pushing the testicle upwards towards the inguinal ring, and occupying the ordinary position of the testicle, could be readily mistaken for that organ. In one stallion (XVIII) there is marked paralysis and atrophy of the extensor muscles of one forearm (*extensor metacarpi magnus* and *extensor pedis*, which may be due to the disease, but more likely to accidental injury.

Course and termination. The course of the disease is very prone to remissions and exacerbations, progressing slowly in the majority of cases to a fatal termination.

Recovery may and does occur, even after extreme emaciation, and when paralysis has been so complete that the animal could not rise without assistance.

The duration of the disease may extend from three months to as many or more years, and recovery, either apparent or real, take place at any intervening time.

Pathological Anatomy.

In animals which have succumbed to, or been destroyed in the last stages of, the malady, there is seen quite uniformly an evident degree of anæmia and emaciation. Distributed throughout nearly every tissue in the body there is found a characteristic yellowish deposit of gummatous materials, bearing a close resemblance to the gummata of human syphilis, especially abundant in

the subcutaneous and intermuscular connective tissue, and nearly every organ of the body partakes of the general yellowish tinge.

The muscles, especially those of the thigh and croup, are pale and soft, sometimes showing marks of fatty degeneration.

The bone tissue is fragile, and both cancellated tissue and medulla show large brown patches.

In each autopsy made the coxo-femoral articulations (hip joints) were found much altered, their ligaments enlarged, softened, and congested. Other observers state that in some cases these ligaments become so fragile from disease that they are sometimes ruptured.

The synovial capsules of the hip joint were found filled with reddish-coloured synovia, and the membrane injected and dark coloured, and in several cases in the acetabulum was found a well-marked dark purple spot, surrounding the attachment of the round ligament of the hip joint (ligamentum teres).

The bowels were found pale, and in some cases showing signs of previous inflammation on their peritoneal surface. The mesentery presented a pale saffron colour and increased thickness, due to a gummatous deposit.

The mesenteric lymphatics were uniformly enlarged, pale yellow, and friable.

The spleen was pale, small, shrivelled, tough, and hard.

The liver was soft and filled with dark blood.

The kidneys were found somewhat enlarged, very pale, and containing considerable watery fluid.

The genital organs fail to exhibit the extraordinary changes one would naturally expect to find. In a well-marked case in a mare, affected one year, where the vaginal discharge persisted to time of slaughter, the autopsy revealed the uterus and vagina containing a considerable amount of a dirty greyish-yellow purulent matter, the uterus enlarged to thrice its natural size, and its lining membrane and that of the vagina pale yellowish white, thickened and wrinkled. The left ovary contained a cyst, filled with one ounce of yellowish serum.

Stallions.—Autopsies on several stallions, all diseased from one and a half to over two years, exhibited the general changes as previously indicated, while in some cases the genitals showed marked changes, and in others there were very slight deviations only from the natural state. One very bad case, Black Brilliant (XIII), had scrotum enlarged to about ten times its natural size, hard and unyielding to the touch. The skin of the scrotum was enormously thickened and of a pale yellow colour. The inguinal gland of the right side was the seat of an extensive abscess, opening at the upper part of the scrotum. A large abscess, occupying the usual position of the testicle, filled with dark yellow, hard, cheesy pus, pushed the testicle from its place up into the inguinal ring. The testicle was small, atrophied, soft, flabby, and pale yellow, with the membranes firmly adherent at every part.

Penis offered no external evidence of disease.

Urethra contained a small amount of a dirty puriforum matter, the living membrance appearing roughish, greyish-yellow in colour, without any appearance of ulcers.

The seminal vesicles and enlarged portions of vasa deferentia contained a considerable amount of thin, greyish, puriform matter.

The left testicle was about natural in size, with coverings firmly adherent to every part. No appearance of ulcers was found in the urethra of either of several stallions examined, but all seemed to offer, in a greater or less degree, a collection of unnatural puriform material in the vesiculæ seminæ and vasa deferentia, from which, so far as could be seen, the infecting material had been derived.

The testicles were uniformly pale yellow, soft and flabby, and almost invariably smaller than natural.

In some cases the coverings of the testicle (tunica vaginalis propia and tunica albuginea) were thickened, adding to the gross size of the testicle and giving it a somewhat firmer feel than where this thickening was absent. The two peritoneal coverings were more or less completely adherent to each other. The condition of the sheath and scrotum varied widely from the normal size to the great enlargement in the cases noted above.

Other observers have noticed inconstant changes in the nervous system, principally of injection of the coverings of the brain and spinal cord, softening of the lower part of the cord, and occasional extravasation of fluid into the ventricles of the brain.

The nasal mucous membrane usually shows catarrhal inflammation, with collections of pus or mucus in the nasal cavities.

Metastic abscesses may occur in the testicles, spermatic cord, lungs, and other organs.

Diagnosis.—Of all contagious diseases, none probably are so insidious and difficult of positive diagnosis as Equine Syphilis in imperfectly developed, isolated cases, without a clear history, and since we now have the disease in our midst, a reliable means of diagnosis is certainly a desideratum.

To this end we should first decide whether or not there is a benign and a malignant form of this disease.

All English writers mention two forms, relying for their descriptions upon translations from the French and German.

Judging from these translations, it would appear that those authorities differ among themselves as to the existence of two forms of the disease, English writers, rather ineffectually, attempting to harmonise certain radical differences in symptoms by bringing to their aid climatic influences or different sources of origin.

Evidently, in some of these translations two distinct disorders are confounded, and Rodloff is undoubtedly correct in the main when he asserts that the so-called benignant form of Equine Syphilis is a wholly distinct benign affection.

In attempting to follow the writings in a foreign tongue, that very able and careful author Dr. Fleming is led into some remarkable contradictions and perplexities. In describing his benignant form, which he asserts corresponds to the first stages of the malignant, he makes particular mention of abundant pustular eruptions on the external genital organs, and later, in describing the malignant form, admits that in many of the most serious outbreaks these eruptions were absent, and yet these cases must pass through the primary stages like the benign.

We understand that a benign disease is one of a mild character not dangerous to life, while a malignant disease is one which jeopardises the life of the afflicted being.

Now, Fleming, discussing the nature of the disease, says, "And we must be content with the statement that it is an eminently virulent malady." Again, under the head of "Course and Termination," he says, "As a rule the progress of the disease is slow, and its termination most frequently fatal."

Again, still under the head of "Mortality and Loss," after quoting serious losses in several outbreaks, he says, "But it may be sufficient to state that the loss is variable, though always very serious, and is seldom less than fifty per cent., rising even to seventy," a remarkably severe loss for a disease frequently benign.

In no outbreaks is there a loss of less than forty to fifty per cent. mentioned, whereas if there be a benignant and a malignant form, the one passing into the other by imperceptible gradation, we should expect a like gradation of

losses, instead of nothing in the benign and fifty to seventy per cent. in the malignant.

Quoting a Bohemian writer, Fleming makes the incubative stage from eight to sixty days; while citing Haubner, writing of the benign form, he makes the time three to six days, thus apparently sanctioning the idea that a benign attack of a disease develops far more quickly after infection than a malignant one, although this benignant form is essentially the same as the first stage of the malignant.

Again, under the head of "Exanthema of the Genital Organs," Fleming describes a distinct exanthematous disease, without making any marked distinction between it and his benignant type of Maladie du Coït, and mentions, as synonyms, names taken from his "Synonyms of Maladie du Coït."

Professors Williams and Law follow briefly the description of Fleming, emphasising the pustular eruptions on the external genitals, as described by Fleming in his *exanthematous* affection and in his benign Maladie du Coït, and both are silent regarding the wholly distinct benign exanthematous disease, which is far more widespread and common than Maladie du Coït, is characterised by abundant pustular or vesicular eruptions upon the external genitals, which appear in successive crops, heal rapidly, and disappear spontaneously, or readily yield to simple local treatment in three to ten weeks, and rarely, if ever, ending fatally.

This disease has been fully described in my report of an outbreak at Kempton, Ill., which I investigated by your orders in October last, and which is undoubtedly the disease which most authors confound with the malignant disease under consideration.

While investigating the outbreak in De Witt County, I had occasion to see a young roadster stallion, property of B. F. Nickerson, of Heyworth, Ill., which was affected with abundant vesicular eruptions on the genitals, appearing in successive crops, healing rapidly, and leaving a temporary white cicatrix at the seat of the eruptions.

This horse being at the immediate border of the infected area, and relying upon the description of English writers, it was very naturally supposed that this horse had been exposed to and contracted the disease, but careful investigation showed that he had not been exposed, that all mares served by him remained sound, and in a few weeks' time the horse had completely recovered, and was unquestionably affected with the same benign venereal disease as that observed at Kempton.

There has been nothing about the present outbreak to suggest benignancy, as over fifty per cent. have already succumbed; a number were so worthless that they were bought at your orders, for a nominal price, and killed; and the few that remain have not passed through the malady without jeopardy to their lives, and in many cases their peril is not yet passed. Taking all facts into consideration, therefore, is seems quite reasonable to disagree with most writers and agree with Rodloff, that the so-called benign and malignant types of Maladie du Coït are really two wholly distinct affections, and admitting the existence of a malignant form only, which we choose to denominate Equine Syphilis, and a wholly distinct benign venereal disease, we are better prepared to arrive at a safe diagnosis.

The pathognomic signs in the mare consist, then, in the appearance, in eight to many days after coitus with an affected stallion, of well-marked uterine and vaginal irritation, with redness of the vaginal mucous membrane, and mucus becoming a muco-purulent discharge from the vagina, swelling of the lips of the vulva, enlargement, loss of pigment and unnatural dryness of the clitoris, and loss of pigment along the margin of the vulva and on the thin skin of the vulva, anus, perinæum, under side of tail, etc.

This depigmentation is peculiar and characteristic, presenting a marked distinction between the two venereal diseases.

In Equine Syphilis these white spots are *not* the result of pre-existent ulcers or erosions, but the depigmentation takes place without any other changes in the skin observable to the naked eye; while in the exanthematous disease the discoloured spots are the results of previous eruptions, and are no larger than the parent ulcer ($\frac{1}{6}$ to $\frac{1}{4}$ inch in diameter), and regular, circular in outline, the pigment being most completely destroyed at the centre and being replaced by pigment first at the periphery; while in Equine Syphilis these white patches are indefinite in extent and contour. They may be one-quarter to one, or even four or five inches in diameter, or the different patches may extend and coalesce, until the whole perinæal regionis devoid of pigment, and when the pigment is replaced it is deposited hap-hazard over the entire discoloured skin. The discoloured spots in the benign exanthem are very transient, disappearing in ten to fifteen days, while those of Equine Syphilis persist for six to eighteen months and even longer, disappearing first or parts farthest from the vulva, then the margins of the vulva lips, and lastly the clitoris.

The open vulva and enlarged, protruding, unnaturally dry clitoris, especially in young and otherwise healthy mares, is quite pathognomonic. The welt-like, lenticular swellings in the skin of various parts of the body, the rapidly progressing emaciation without loss of appetite, the erratic and peculiar lameness and paralytic symptoms already described should, when present, suffice with the above to enable us to form a safe diagnosis.

In the stallion the history of the case, whether exposed or not, or whether infecting mares or not, is all important, otherwise the diagnosis is generally difficult and sometimes impossible. The constitutional symptoms, when present, are as characteristic in the stallion as in the mare, but the former may be long affected before developing these.

There is usually, however, some abnormality of the external genitals, either of the prepuce, sheath, testes, penis, or scrotum.

The prepuce, when affected in the earlier stages, presents a peculiar œdematous-looking swelling of variable degree, but it is unlike ordinary œdema, the infiltration being more fixed and elastic than in true œdema and not pitting distinctly on pressure; neither is it hard and indurated, but is yielding, painless, and elastic.

The penis when affected offers specially its pendent character; it hangs too far out of the sheath, generally in the prepuce, but in extreme cases hangs entirely out of the prepuce and sheath, full length and powerless, so that when the animal is trotted the penis is thrown from flank to flank by the swinging of the body.

When the testes are affected they may be atrophied and high up against the inguinal ring, or apparently enlarged and pendent, are usually soft to the touch, and indefinite in contour from adhesion of the coverings.

The prognosis is always unfavourable, and there is no safe guide by which we can predict the final result.

The mortality ranges usually between sixty and eighty per cent. of the affected animals. In the present outbreak, as shown by footings of the stallion list, almost seventy per cent. have died or been killed, at a nominal price, as practically worthless; and when we consider the imperfect recoveries in those remaining, the exceedingly protracted course of the disease, the expense of keeping while affected, and expense and trouble of treatment, the direct monetary loss to the owners has considerably exceeded the original value of the entire number of affected animals.

Contagium is "fixed," that is, transmissible only by direct inoculation, and

is thought by many authors to exist mainly or only in the secretions of the urethra in the horse, and the vagina and uterus in the mare.

Autopsies in several stallions in the present outbreak revealed no ulcerations or disease of urethra, but there was every reason to believe that the seminal vesicles and the enlarged portion of the vas deferens were the real sources of principal supply of the infecting virus in the stallion. Experiments by European veterinarians, as well as observations in the present outbreak, demonstrate fully that the disease is contagious, but it seems impossible to transmit the disease to others than solipeds (horse, ass, and mule).

The vitality of the virus is unknown; in affected animals it certainly persists for several years.

It is transmitted practically only by direct contact of a diseased with a healthy animal in the act of coition, although it is possible to transmit the disease by inoculation.

Cohabitation without sexual intercourse will not produce the disease.

Its extension is affected by diseased stallions and mares, the insidious character of the malady in both being specially favourable to the transmission of the disease to remote localities, where it may gain a serious hold and wide dissemination before its dangerous character is ascertained.

Treatment.—The chances of effecting a cure, or exerting by any known treatment any marked influence on the course of the disease, are very remote. Many different lines of treatment have been proposed, but their beneficial effects have not been well demonstrated.

Locally we should expect benefit in the earlier stages of catarrhal inflammation of the vagina and urethra, from emollient or mildly astringent injections, and later by the use of remedies of a more decided astringent nature—nitrate of silver, sulphate of zinc, sulphate of copper, etc. In three stallion cases of over one year's standing, showing well-marked urethral irritation and discharge, these symptoms were promptly eliminated by cauterisation of the urethra throughout its entire length with solid nitrate of silver. We would naturally expect benefit, in cases of long standing, from the use of alteratives, such as mercury, iodine, and arsenic; and where used in the present outbreak they have at times appeared to have a beneficial effect, or at least it could not be seen that mercury aggravated the disease, as some authors have stated. Castration is said to have a beneficial influence on the course of the disease in stallions, but it has not been tried during the present outbreak.

Prevention and Extirpation.—We are suddenly awakened to the existence of this, to us, hitherto unknown disease in our midst, and if not dealt with firmly and heroically, it must prove a serious scourge to the horse interests of Illinois and the country at large, and it is to be hoped that the sad experience of De Witt County may prove a timely warning.

The work of control and extirpation has surpassed our expectations in effectiveness in many particulars, due largely to an unusually hearty co-operation of almost every horse-breeder in the infected district, frequently at no small personal sacrifice; and to a continuance of this same earnest assistance we must largely look for an effective controlling and stamping out of the disease.

At the beginning of the investigations Messrs. Harrold and Culbertson and Foley and Seniff furnished a complete list of all mares bred to their stallions since affected, and other stallion owners followed their example freely, and by these lists every mare was traced as far as possible, and if found alive in the State was quarantined; and every diseased, suspected, or apparently at all dangerously exposed stallion was treated likewise. All exposed mares in the State were personally inspected by Dr. Casewell or myself, or their con-

dition otherwise reliably learned, and the notices of quarantine were served by Dr. Casewell, myself, or W. H. Wheeler, of Clinton.

Every stallion kept for public service in the entire infected area, so far as could be learned, and nearly every stallion within ten miles of that area, were personally inspected by myself, and the owners and keepers cautioned and advised to the best of my ability.

Since quarantining, three affected mares have died, and nine have been killed by agreement. All but two of the affected stallions (XV and XIV) have died or been killed, and the two remaining ones, owned by J. Fisher, are kept in Clinton, where their movements can readily be followed.

I firmly believe that we now have the disease fully under control in Illinois, and that all we now need is to permanently fix our grasp.

Fortunately, most of the affected mares are dead, and there now remain twenty-one affected in De Witt, one in Piatt, and one in Peoria County. Some of these mares are so badly affected as to be comparatively worthless, others are in moderate, while others are in good condition and apparently perfectly sound, and with this latter class rests the greatest danger of renewal of the losses of the past two years. The history of the disease in foreign countries repeats the warning over and over, Never under any consideration allow a mare affected with Equine Syphilis to be bred again.

The failure to heed this warning evidently explains the fact that wherever the disease broke out once it was very likely to reappear three or six years later, through the over-confidence of the owner of an apparently recovered and perfectly sound mare, by again breeding her to a stallion. Hence, at whatever labour or cost, all affected mares should either be killed or held rigidly in quarantine and confined to the townships where found and where stallion owners are acquainted with the disease.

Killing is certainly preferable, wherever it can be readily done, otherwise years of careful watching and supervision must ensue. As to the exposed mares which have not at any time shown any signs of the disease, I would recommend that they be released from quarantine two years after their last breeding to an affected stallion, after the following evidence is produced: first, the certificate of a perfectly reliable veterinary surgeon that he has made a careful personal inspection, and that he believes the mare perfectly free from Equine Syphilis; second, an affidavit by the owner, identifying the mare, giving a history of her breeding for 1885, 1886, and 1887, and affirming that to the best of his knowledge she has never shown any signs of Equine Syphilis.

Stallions.

I would recommend that the Smith and Ledden stallion X be released from quarantine in the spring of 1888, after satisfactory inspection, he having never, so far as can be learned, served any evidently diseased mare, has shown no signs of disease himself, and has transmitted the disease to no mares.

Numbers IX, XIV, and XV should be held firmly in quarantine until dead or castrated.

In further preventing the spread of the disease I would recommend that the accompanying list of exposed and diseased stallions and mares be printed in convenient form and widely distributed among stallion owners, along with such other matter pertaining to the disease as you may deem best. Among which I would suggest—

1st. A warning to all stallion owners that allowing any of the mares described in the list to be bred to any stallion, except the owner produce a certificate of release from quarantine from the Secretary of the State Board

of Live-stock Commissioners, would subject such stallion to indefinite quarantine.

2nd. A brief summary of the laws regarding quarantines and their violation.

3rd. A concise description of Equine Syphilis, and also of the benign exanthematous venereal disease of horses, Equine Chancroid.

4th. That no stallion owner should allow his stallion to serve mares whose history cannot be satisfactorily traced.

5th. That no stallion be allowed to serve a mare that has any discharge from the vagina or swellings of the vulva, nor mares that show unusually persistent œstrum (heat), nor mares that are extremely old, debilitated, or unthrifty in appearance, nor that present any discharge from the nostrils or show unhealthy sores on any part of the body, or mares partially paralysed or unaccountably lame in the hinder parts, especially when accompanied by bad general health.

6th. That all stallion owners should take the precaution to have the penis of the stallion thoroughly washed immediately after serving each mare.

7th. That no owners of mares should permit them to be served by any stallion presenting any enlargement or swelling of testicles, scrotum, penis, sheath, or prepuce, or any undue pendency of penis or testicles, or any unnatural discharge from the penis, or any abrasions, ulcers, or sores of any kind on the penis, prepuce, or sheath, or having any discharge from the nostrils, or any unhealthy sores on any part of the body; or any stallion showing an unaccountable lameness, stiffness, or weakness of loins, except the owner of such stallion produce a certificate from a qualified practitioner of undoubted standing, certifying that such stallion is free from any contagious or infectious disease.

The tabulated list of exposed mares being too long for insertion, the following summary is inserted instead:—

Mares dead of disease previous to date of investigation		47
Died since quarantined (of Equine Syphilis)		3
Killed by orders of Live-stock Commissioners		9
Affected, not found		4
,, in quarantine	23	
Apparently well, in quarantine	193	
Total remaining in quarantine	216	216
Died or killed since quarantine	12	
,, from accident since quarantine	2	2
Total originally quarantined	230	
Animals supposed to be well, not found		116
Total mares exposed		397

Of the four diseased mares marked "Not found," one has later been found and killed at Appleton, Wis., two are the Sandusky Wilson mares (see foregoing report under "Origin of Disease in De Witt Co."); the fourth was sold to unknown shipper, previous to investigations.

The apparently well mares not found were mostly included in a lot of 100 Texas mares, sold in St. Louis, supposedly for the Boston market, for street car work. The others were sold to various shippers, for draught purposes.

The list of stallions, being of less length, is inserted in tabulated form.

List of Exposed Stallions, with Number of Mares Served after Earliest Supposed Exposure.

Arabic numerals refer to mares, Roman numerals to males, throughout Report. The tabulated list of mares is too extensive for insertion here.

Number.	Owners.	P. O. Address.	Breed.	Description.	Condition at Date of Quarantine.	When Exposed.	To What Mare.	When Quarantined.	No. of Mares Served.	No. of Mares Affected.	Percentage of Mares Affected.	No. of Mares Dead.	Percentage of Mares Dead.
I and II	Harrold & Culbertson	Wapella, Ill.	French Draught	Grey	Affected	1884-6	377, 378*	July 25, 1887	177	36	20⅜	29	80⅝
III-VI	Harrold & Culbertson	,,	,,	Black	,,	1886	,,	,, 21, ,,					
VII	Harrold & Culbertson	,,	Grade	Grey	,,	,,	,,	,, ,, ,,					
VIII	W. R. Carle	,,	French Draught	,,	,,	,,	Unknown	,, 22, ,,	9	2	22	2	100
IX	Geo. Halsey	,,	Grade / French Draught	Black	Apparently well	1887	145†	,, 15, ,,	1	0	0	0	0
X	Smith & Ledden	,,	French Draught	Grey	Apparently well	,,	5, 131, 142‡ / 356, etc.	Aug. 5, ,,	(47)	0	0	0	0
XI	Temporary quarantine only.		Affected, but not with Equine Syphilis.										
XII	Foley & Seniff	Wapella, Ill.	French Draught	Grey	Affected	1884-6	377, 378*	July 27, ,,	106	44	41½	28	61
XIII	,,	,,	,,	Black	,,	,,	,,	,, ,, ,,					
III	,,	,,	,,	,,	,,	,,	,,	,, ,, ,,					
XIV	Jos. Fischer	Clinton, Ill.	,,	,,	,,	1887	Unknown	,, 19, ,,	1			0	0
XV	,,	,,	,,	Brown	Apparently well	Before importation.	Affected when imported.	,, ,, ,,	48	2	6¼	?	?
XVI	,,	,,	,,	,,	Apparently well	1887	Mares from XIV & XV.	,, ,, ,,					
XVII	Simpson, Franklin, & Co.	,,	,,	Grey	Affected	1886	186, 187§	Aug. 18, ,,	33	1	3	0	0
XVIII	Lisenby & McNamara	Fresno, Cal.	Grade / French Draught	,,	,,	,,	164‖	Not Quarantined.	123	0	0	0	0
								Total Mares...	397	86	21⅝	59	68⅝

Mule.	Owner.	P. O. Address.	Description.	Condition at Date of Quarantine.	When Exposed.	To What Mare.	Exposed.	Affected.	Dead or Killed since Quarantine.
XIX.	Harrold & Culbertson.	Wapella, Ill.	Black Gelding.	Affected.	1886.	Harrold & Culbertson's.	1	1	1
						Total Stallions	17	14	12
						Total Animals	415	101	72

REMARKS.—I. Died Sept. 16th, 1887. II, III-VI, VII. Killed Oct. 19th, 1887. VIII. Died July 28th, 1887. IX. Castrated 1888. X. Released from Quarantine March, 1888. XII and XIII. Killed Sept. 29th, 1887. XIV, XV. In Quarantine. XVI. Died 1887, from the effects of castration. XVII. Killed Nov. 30th, 1887. XVIII. Last heard from at Fresno, California; still affected, and under no restrictions.

* See foregoing Report, under "Origin in De Witt Co." † Became affected 1886, by being bred to I-VI. ‡ Exposed 1886, but not diseased. § Exposed and diseased, autumn, 1885, by XII and XIII. ‖ Bred to and diseased by XII and XIV early in 1886, and bred late in 1886 to XVIII. XVIII probably served no mares after 164.

PREVENTIVE INOCULATION.*

BY M. ROUX.

In the year 1881, M. Pasteur laid before the members of the International Congress assembled in London an account of recent researches carried on in his laboratory, on the subject of preventive inoculations for Chicken Cholera and Splenic Fever. Since that time nearly eight years have elapsed, and we may ask ourselves what has become of the work then begun: has it fulfilled its promise, and what place have the new principles which it involved taken in the science of to-day? It was on these questions that M. Pasteur intended to have spoken to you this afternoon, but the state of his health did not permit of his availing himself of the honour done him by the President and Council of the Royal Society in asking him to give the Croonian lecture this year. He therefore proposed that I should speak in his name, though personally I cannot hope to speak as he would have done of the preventive inoculations which he himself thought out and initiated. My sole title for addressing you is that of my being M. Pasteur's collaborator, having had, in fact, with Messrs. Chamberland and Thuillier, the honour of being associated with him from the commencement of his researches upon the prevention of contagious diseases, and, further, that I have been an eye-witness of everything which I shall lay before you.

Most infectious diseases never recur, and thus Small-pox, Measles, and Typhoid Fever rarely occur more than once in a lifetime. Further, a first attack of an infectious disease, even though a slight one, renders us safe from these diseases for a certain time; and it is this fact, coupled with the non-recurrence of infectious maladies, which has led to the discovery of preventive inoculation.

Instead of waiting till we are struck down unawares by a sudden attack of the malady, frequently during an epidemic of high fatality, and under conditions very unfavourable to our power of resisting it, we now seek to meet it at some favourable moment, and guarded by all those precautions which we know are capable of greatly diminishing the danger. In the place of natural, that is ordinary, infection, unforeseen and over which we have no control, we have now substituted a mode of artificial infection, prepared in such a way as to ensure exemption with as little risk as possible.

It was against Small-pox that, for the first time, preventive inoculations were had recourse to. An involuntary experiment, and one, unhappily, too often repeated, had shown that the liquid of the Small-pox pustule is virulent, that is to say, that this Small-pox lymph, introduced into the body through a wound in the skin, has the power of communicating the disease to a person who has not previously suffered from it. Inoculation with Small-pox was, therefore, easy; all that was required for its production being a prick from a lancet charged with Small-pox pus. It was, therefore, the custom to endeavour to find cases of mild Small-pox, from the pustules of which a virus was taken supposed to be non-malignant, but yet capable of subsequently rendering exempt against the virulent disease those who were inoculated by such a mild virus. It is well known to you how widely such inoculations spread, though far from being of an innocent character, for the inoculation which was supposed to give the disease in a mild form often produced it very severely, and sometimes even the inoculation was the cause of death.

How great, therefore, was the progress made by Jenner in replacing inoculation by vaccination, that is to say, in substituting for a severe illness one which is invariably insignificant, and yet is an efficient protection against infection by Small-pox!

* A lecture delivered before the Royal Society, on behalf of M. Pasteur. From the *British Medical Journal*.

autumn, 1885, by XII and XIII. ‖ Bred to and diseased by XII and XIV early in 1886, and bred late in 1886 to XVIII. XVIII probably served no mares after 164.

Although from the beginning of this century we have enjoyed the inestimable benefit of Jenner's vaccination, we still have not yet completely fathomed its meaning. What is the relation between vaccination and Small-pox? Why does the vaccine disease of the horse and the cow, inoculated into man, render him exempt from Small-pox? Is the virus of vaccine merely that of Small-pox modified, or are vaccine and Small-pox two different maladies?

It would have seemed that these questions were easy to resolve, as both Small-pox and vaccine admit of experimentation upon them; yet, though always under discussion since Jenner's time, they yet remain without any definite solution having been arrived at. Jenner's great discovery, which seemed to open so wide and hopeful a horizon, has remained hitherto a solitary fact in medicine. Born of a happy observation, marvellously developed by a genius as patient as it was penetrating, it was at the time of its birth so far in advance of the medical science of the time that even now, after all the progress which has been made during the last seventy or eighty years, we can but suspect its real interpretation. Jenner thus demonstrated to us, by one remarkable example, that it is possible to protect ourselves from a mortal malady by inoculation with a trivial one; but he gave us no general method leading to the prevention of other infectious diseases.

The discovery of the power of artificially attenuating—that is, weakening—a virus does, on the contrary, furnish us with a veritable method of protective inoculation, and it is one which has given us an uninterrupted series of good results, though this invention dates from but a very few years back. Like all other recent progresses in our knowledge of virulent diseases, it found its origin in M. Pasteur's researches on ferments. In revealing to us the nature of ferments, he taught us that of the poison of infectious diseases. Like the yeast of alcoholic and the yeast of lactic fermentation, viruses are living beings—microbes, as they are now called—and, just as the development of yeast in a sugary liquid produces alcoholic fermentation, so that of microbes in the tissues of the body produces the phenomena of infectious disease. The process which has enabled us to obtain the culture of microbic ferments in a state of purity is the same which has enabled us to obtain pure cultures of microbic virus outside of the body.

The indispensable condition of success in these cultivations is that of absolute purity—that is to say, the avoidance of the introduction of other foreign germs which everywhere surround us. For this purpose we have now arranged a definite *technique*, strict, but at the same time very simple. As the elements of the virus are living beings which can be kept in artificial cultivations, and as they are only distinguished from other lowly organised beings and plants by their property of invading the bodies of men and animals, the question naturally presents itself, Would it not be possible to modify them by cultivation in the same way that other plants are modified? Could they not, for example, be thus robbed of those qualities which make them formidable? To modify a virus by special modes of cultivations—such was the idea of M. Pasteur; a fruitful idea, from which have sprung those discoveries which I now propose to lay before you.

It was in studying a malady called "Chicken Cholera" that M. Pasteur for the first time obtained by this means an attenuated virus. This disease is so fatal to fowls, pigeons, and birds in general that it has been given the name of Cholera. It is caused by the development in the bodies of those attacked of a very small microbe, shaped like a small rod with rounded ends, and almost as wide as long. The photograph projected on the screen shows us the image of a drop of blood taken from a fowl which succumbed to the natural disease. You see between the globules of the blood the little rods which are the cause of the disease. It is, however, not the blood alone in

which the microbe is found; all the tissues are invaded by it. The intestines contain a great quantity, so much so that the dejecta of the sick fowls are able to spread the malady, and it is in pecking upon the contaminated ground that healthy birds are infected.

If a minute drop of blood from a fowl which has just died of the malady be introduced under the skin of a healthy fowl, the animal inoculated soon falls ill, ceases to eat, its feathers are erected, its wings hang down, and it seems oppressed with unconquerable somnolence. It soon dies, sometimes in less than twelve hours. The blood of the bird which has thus died from experimental inoculation is found to be swarming with the microbe, exactly like that of the fowls which die after natural infection. It seems, then, that Chicken Cholera is a contagious disease capable of inoculation, and in which the virus is principally contained in the blood of the animals attacked by it. The culture of the microbe which is so easily accomplished in the blood of the animals can also be carried on artificially.

If with proper precautions we inoculate chicken broth slightly "alkalised," and perfectly limpid, with a drop of the blood, and if we then place the bottle in a stove at 35° C., we shall find after some hours that the broth is turbid, and that this is due to the development of the little Chicken Cholera microbe. Under the microscope we shall see that each smallest drop of this *bouillon* contains an innumerable swarm of motionless microbes, like those contained in the blood which served as "seed." An infinitesimally small quantity of this first culture placed in a new bottle will give a second culture, and by successive cultivations as many successive generations of our microbe as we wish for can be obtained. Each drop of these cultures, even up to the twentieth, would kill, with all the signs of Cholera, quite as surely as the first, any fowl which was inoculated by it. This experiment affords a decisive proof that the virus of the malady is without doubt the microbe found in our cultures, and as we now know how to prepare under absolutely certain conditions as large quantities of the virus as we wish for, we have all the means at hand for the study of this disease.

If we expose at a temperature of 33° C. to the contact of the pure air which penetrates through the cotton wool stopper of the culture flask one of these cultivations, which is so active that a drop of it would kill any fowl into whom it was inoculated, and if each week we extract a small quantity of the contents of the flask and try its virulence upon healthy fowls, we observe the following changes: During the first week of the experiment all the fowls inoculated die, but after a longer time a change sets in in the degree of virulence. Not all the fowls now die when a certain quantity of this longer preserved culture is injected under their skin. Some recover after having been very ill. As time passes the strength of the virus is still more diminished, and the number of fowls which recover increases. At last, in continuing the experiment, the moment comes, say, for example, after it has remained for two months in the incubator, when this virus, at first so deadly, not only will not kill a single fowl, but causes them apparently no inconvenience whatever; and yet the virus is not dead, for it still grows in fresh nutritive substance in which it may be sown. But in this new culture none of the former virulence returns. The daughter cultures have exactly the same effect upon the fowls as the mother culture had at the time when it furnished the fresh seed. The new property of the virus, therefore, that of harmlessness for those animals for which it was formerly so fatal, can be perpetuated for successive generations. By making such cultivations we shall obtain at their respective dates a whole series of kinds of virus of diminishing activity capable of giving to the animals either a fatal malady, a dangerous malady, a serious malady, or one wholly inoffensive.

To what cause is this gradual diminution of the malady due? To the con-

tinued action of the oxygen of the air. If, instead of making the cultivation in a bottle where the renewal of the air is possible, we were to make it in a closed tube only containing a small quantity of air, the microbe would soon consume all the oxygen, and would cease to grow, for oxygen is a necessity of its development. In a tube deprived of air it cannot grow; it remains alive in it for a very long time, as one can satisfy oneself by sowing in aërated *bouillon* the small culture formed in these sealed tubes. After being preserved for a year in this sealed tube it still gives cultures which are as active as a recent culture from the blood of a fowl just dead of Chicken Cholera.

We see, therefore, that the diminution in virulence which takes place in those cultures exposed to the air is dependent on that exposure, and not on the length of time the microbe is kept.

Gentlemen, what results were won, what new ideas gained by this single experiment on the culture of the microbe of Chicken Cholera? By it M. Pasteur showed us that the viruses of infectious diseases are no more the unchangeable entities they were before imagined to be. He taught us that, like all other living beings, the microbic virus is susceptible of modifications which heredity perpetuates, that it is above all the virulent character which becomes modified, and finally that this modification can be produced artificially, and regulated according to the wishes of the experimenter. By this experiment M. Pasteur established the attenuating influence which the air possesses; at the same time he explained how it is that the activity of a virus, under natural conditions as seen in epidemics, is preserved or exhausted, and how the same malady may be sometimes malignant, sometimes light.

We have seen how fowls inoculated with attenuated Cholera virus, suitably chosen, took the light form of the malady and soon recovered. If, now, you inoculate these recovered fowls with blood from a fowl dead of the virulent disease, and at the same time you inoculate a number of fresh fowls, you will find that all the fresh fowls will die, while those previously inoculated with attenuated virus will resist the disease. They will merely have a passing illness, which soon disappears. The inoculation with the attenuated virus has rendered them exempt from the fatal form of the disease; it has given them immunity; and if, in the same animals, you make successive inoculations of increasing intensity, you will make them refractory to Cholera to such an extent that you may inoculate them with the most virulent blood, under conditions where they would be exposed to the most intense natural contagion, and they will not experience the least inconvenience from it, and it will be impossible to kill them by this illness, which was formerly so formidable.

The attenuated virus therefore discovered by M. Pasteur is quite as efficacious against Chicken Cholera as Jenner's vaccination against Small-pox. But while we are ignorant of the relations between Small-pox and vaccine, none of the relations between the vaccine virus of Fowl Cholera and the virulent virus are hidden from us.

This plan, moreover, is not only successful in the case of Chicken Cholera, but constitutes a definite method of attenuation of virus, the value of which has been proved by the production through its means of the vaccine of another malady more interesting than Fowl Cholera, as it is both a scourge for cattle and can also be transmitted to man. I mean Splenic Fever, Anthrax, or Charbon, for it is by the regulated action of heat and air upon the Anthrax virus that the vaccine of this malady has been obtained; but in the case of Anthrax a difficulty arose which was not present in that of Chicken Cholera.

The Anthrax virus is found in the blood of animals which have just died of the disease. Cultivated in veal broth slightly alkaline, it forms a culture resembling cotton down swimming in a clear liquid. This down is formed by

long and interwoven filaments, as you see them in the photograph. In the interior of these filaments, after some hours, you see bright spots beginning to appear, the outline of which become more and more distinct. These brilliant spots are the germs or spores of the bacillus discovered by M. Koch; these spores are the veritable seeds of the microbes, and as grains of corn, for example, offer more resistance to heat and dryness than does the growing corn, so the spores can bear without perishing a temperature of 90° C., and the action of a number of agents which would kill the bacteride in its filament stage. The spore is thus the resistant condition of the microbe of Anthrax, and wherever it finds conditions favourable to germinating, either in the body of an animal or in some artificial nutritive culture, it will give forth filaments, and these in their turn will produce new germs.

If we expose the Anthrax bacillus to a temperature of 38° C. and the contact of the air, as we did the microbe of Fowl Cholera, its virulence will not diminish. Even at the end of a long period it would still kill all the men and animals into whom it was inoculated. It consequently appears that the oxygen of the air is in this case unable to exert its attenuating influence, because the spores which are formed during the first hours of the culture are able to resist its action. In order, therefore, to repeat the conditions analogous to those which were successful in the Chicken Cholera, we must first prevent the bacilli from producing spores. The way to do this is by cultivating Anthrax not now at a temperature of 35°, but of 42° to 43° C. Under these conditions the bacilli develop, producing the filaments, but no spores. If we try every three days, for example, the intensity of the virulence of a culture thus made at a high temperature, and in which no spores are formed, by inoculating it into sheep and rabbits, we shall find that in the first days of the experiment all the inoculated animals succumb; then that the virus becomes less active, and the sheep resist, while the rabbits still die, though after illnesses more and more prolonged. After a still longer period the culture made at 42° loses its danger for the rabbit, but is still fatal to guinea-pigs and to mice. Finally the moment arrives when it is quite harmless even to these little rodents, very sensitive to the Anthrax virus as they are. We here see, as with Fowl Cholera, the virus passing through all the stages of decreasing virulence and finally becoming harmless. The bacilli, which at a high temperature give off no germs, yet form them rapidly if cultivated at 30° or 35° C., and the spores which are then produced preserve the same degree of virulence as the filaments from which they were derived. It is, therefore, only necessary to draw off each day a little of the culture from the bottle at 42°, and to place it in *bouillon* at 85° C., in order to have a series of cultures of graduated virulence and furnished with spores capable of fixing each of these special degrees of intensity. The sheep and oxen which receive these attenuated bacterides exhibit a passing fever, but if, later on, you inoculate them with virulent virus, it has no effect upon them. One has, therefore, only to choose among the degrees in this scale of virulence that which will give to the animal one is desirous of protecting from Anthrax an illness slight but sufficient to ensure the desired exemption. In practice the vaccinations of oxen and sheep are done twice. The virus of the first inoculation is very attenuated, and is intended to prepare the animal for the action of the second and more energetic inoculation, which is prepared twelve days after the first. The whole difficulty in Anthrax inoculation consists in the choice of these two viruses, and in keeping the relation between their degrees of virulence invariable. Everyone still has in his remembrance the striking demonstration of the efficacy of these preventive inoculations given at Pouilly-le-Fort in 1881. Five-and-twenty sheep, chosen promiscuously from among fifty, were inoculated with attenuated virus of Anthrax, and afterwards with the virulent virus at the same time that twenty-

five other fresh ones were inoculated as a control experiment. The twenty-five vaccinated sheep remained healthy; the twenty-five control sheep died of Anthrax. Demonstrative as this experiment was, it did not obviate violent attacks, the first of which was against the principle of the method.

The possibility of obtaining attenuation of the Anthrax virus under the conditions laid down by M. Pasteur was denied. It is, however, unnecessary to dwell upon this point, as it is admitted even by those who contested it, for example, Koch and others; and the attenuation of the bacilli cultivated at 42° C. has become a classical fact. The answer to lay criticism is to be found in these tables, which give the number of animals inoculated in France since 1881.

TABLE I.—*Animals Vaccinated against Anthrax.*

Years.	Sheep.	Oxen.	Mortality among Sheep.
1882	243,199	22,916	1.08 per cent.
1883	193,119	20,501	0.77 ,,
1884	231,693	22,616	0.97 ,,
1885	280,107	21,073	0.90 ,,
1886	202,064	22,113	0.75 ,,
1887	293,572	42,538	
1888	269,599	34,464	

The mortality among sheep before the preventive vaccination for Anthrax was 10 per cent.; since that period it has fallen to less than 1 per cent.

It shows how firmly established these inoculations are in agricultural practice, while the rise in their number is the most convincing proof of their efficacy. The farmer, of course, cares nothing for scientific discussions. For him, preventive vaccination is judged entirely from the standard of profit and loss; and in eight years he has had ample opportunity of coming to a definite conclusion on this point. The mortality among sheep in the Anthrax districts has gone down from 10 per cent. to 1 per cent. Insurance companies insert a clause in their agreements making preventive inoculations of the insured cattle obligatory; and in Austria, Italy, and Spain the vaccinations are beginning to be widely adopted. What better arguments could be adduced to prove the great service which the discovery has rendered to agriculture? But I do not desire to dwell on this point, and will proceed, having already discussed the attenuation of the virus, to consider the fact of its return once more to the virulent condition.

If in Nature we were to come across one of these attenuated bacteria which we have learnt to prepare, and which are so harmless as to be incapable even of killing a mouse, it would clearly be impossible for us to recognise in this inoffensive microscopical object a descendant of the terrible bacillus anthracis. To do so it would be necessary to have watched it in its stages of gradual attenuation. It is, however, possible (always supposing that the process of attenuation has not been carried too far) to make the bacillus reascend the steps of virulence down which it has come, and so to render it once more virulent.

We have stated that it was not capable even of killing adult mice; but let us inoculate with it a very young mouse, only one day old. This young mouse will be much more sensitive to the action of the virus than the grown up one would be, and it will die in a few days. In developing itself in this young mouse, the bacillus will have recovered a portion of its old fitness for life in

living surroundings; and the blood of this first mouse introduced into that of one a little older will cause its death, and thus proceeding step by step from the youngest mouse to the oldest, it will gain power to kill first old mice, then guinea-pigs, rabbits, sheep, and, last of all, oxen, which are among herbivorous animals the most callous to the action of Anthrax.

Thus we see that we can increase the virulence as easily as we can diminish it; and that it manifests itself by the increasing power of the microbes to germinate in the bodies of living animals, a power which can thus be either acquired or lost under respectively appropriate conditions. That this increase of virulence which we have thus excited is going on in Nature we can well imagine; and that a microbe, at first harmless for a particular kind of animal, should afterwards become dangerous to it. Given that some fortuitous circumstance should have introduced it into an animal with but feeble power of resistance, and it will grow there. This first cultivation will adapt it to parasitic life; it will pass out ready to develop in an organism in which it could not previously have gained a foothold, and after several such passages it will become really formidable.

There is no rashness in believing that by such means in the course of ages new forms of virulence have been evolved, and that these experiments on the variation of virulence throw a flood of light on that most obscure of questions, the origin of new virulent diseases. For these results also explain how one and the same kind of microbe can produce such diverse morbid effects; how, in its active or virulent state, it causes a general disease, rapidly ending in death, and in its passive or attenuated condition produces nothing more than a special local lesion.

Other viruses have also been attenuated by this method of the action of the air upon the cultures. At the Congress held in Geneva in 1882, M. Pasteur cited a whole series of fresh examples. I shall, however, only speak to you of the attenuated virus of a special form of Swine Fever, a disease much dreaded by farmers, and known in France by the name of "*rouget*,"* as the sick animals are distinguished before death by red patches on the skin.

The microbe of *rouget* is a bacillus which is found in the spleen and the lymphatic glands of the swine which die of the disease. In cultivation it produces no spores, and is therefore specially amenable to the influence of the air, and, in fact, if left long enough exposed to its action, its virulence is totally destroyed. But there is a further method of attenuation discovered by MM. Pasteur and Thuillier, and which is of great interest, as it shows the changes which a virus may undergo in its passage through animals of different kinds. *Rouget* injected into a rabbit kills it within a few days. A small quantity of the "pulp" from the spleen of this rabbit inoculated into a second one will cause death still more quickly, and the disease can thus be passed through a whole series of rabbits. But the extraordinary point (discovered by MM. Pasteur and Thuillier) in these inoculations is that, as the strength of the virus increases for the rabbit it is diminished for the pig; so much so that, after a sufficient number of passages of the virus have been made through the rabbit, it has become a vaccine for swine, able to confer upon them exemption from the fatal form of malady.

With this example before us, the question arose, What would happen with certain human diseases if we made them also pass through a great number of different kinds of animals? Is not this very process taking place in Nature, and does it not give fresh support to the idea that the vaccine of Small-pox becomes modified by its passage through the horse and the cow?

After all this work upon the prevention of Fowl Cholera, Anthrax, and Swine Fever had been accomplished, M. Pasteur devoted himself to the study

* This form is known in Ireland as "red soldier," and is not the same disease as the pneumono-enteritis called "Swine Fever" in this country.—Tr.

of Rabies. When, in 1880, the study of this disease was begun in M. Pasteur's laboratory, the following facts concerning it were alone known: that it was an infectious disease, that the virus was contained in the saliva of rabid animals, and that it was transmitted through their bites. We knew also that the period of its incubation varied from some days to some months, and here our definite knowledge of its pathology ended. Many experiments, however, had been made on the subject, but two causes had rendered them especially difficult to carry out and their success uncertain.

Inoculation of the saliva of a rabid into a healthy animal does not always produce Rabies, but often has no effect whatever. Among animals susceptible to the malady, some only become rabid after such a lapse of time that the prolonged waiting, combined with the uncertainty of the results, puts the patience of the experimenter to a most severe test. The saliva of a rabid animal affords an untrustworthy virus, because it contains a quantity of different microbes, which, when introduced under the skin contemporaneously with the virus of Rabies, may prevent the development of this latter, and set up inflammatory processes originated by their growth. The first thing to do, therefore, was to find some source of the virus of Rabies which should be uncontaminated by other microbes. All the symptoms of Rabies arise from the disturbance of the nervous system; hence the idea that in that system the rabic virus was specially to be found presented itself to the mind. The previous attempts made, however, to show that the nervous system of a rabid dog was virulent were unsuccessful, because the manipulations to which the nervous matter was exposed in order to inoculate it introduced into it those other microbes which it was essential to exclude.

By inoculating with absolute purity from the spinal cord the brain or the nerves of an animal which had died of Rabies, M. Pasteur demonstrated that the true seat of the virus was to be found in the nervous system. A portion of the nerve centres of a rabid dog, injected subcutaneously into a healthy one, will produce Rabies more surely than the most active saliva. This demonstration enabled us to take a decided step forward in its study. The rabic virus being contained in the nervous centres, and the symptoms depending entirely upon that system, the idea naturally followed that the disease only shows itself when the nervous centres are attacked by the virus. Further, that the incubation period is governed by the time taken by the virus to travel from the point inoculated up to the cerebro-spinal axis and for its development therein. If, therefore, the virus be inserted directly into the nervous system, where it has to develop, the incubation ought to be shortened and the disease follow with certainty, because the virus can no longer be destroyed or diverted from its course during its long journey.

Gentlemen, experiment has fully confirmed this theory, as may be seen from the record of the first dog inoculated by trephining, in which the incubation period was reduced to fourteen days. In fact, any dog inoculated under the dura mater with a little of the spinal cord or brain of a rabid dog takes Rabies with absolute certainty and within a period rarely extending beyond eighteen days. Thus we are delivered from the uncertainties belonging to subcutaneous inoculations and from the weariness of a long incubation period. After this experiment the study of the disease went rapidly forward; it was proved that the virus existed in the nerves and that by that route it travels from the original wound to the brain and spinal cord, and also that it can in some cases be conveyed by the circulatory system. It will be seen, therefore, that the manifestations of Rabies may be varied, as the manifestations of the disease in the beginning will depend upon the particular region first encountered by the virus, and finally why it is that there are forms of the disease which until now were unrecognised, and which differ from the classic type. The operation of trephining is in itself harmless when performed with

proper antiseptic precautions. It is as successful with the rabbit as with the dog. If inoculation by trephining is performed upon a series of rabbits, from the spinal cord or medulla oblongata of an animal which has just died, and this process is continued with successive animals, we find that the duration of the incubation period, which was at first from fourteen to eighteen days, gradually diminishes. It becomes shorter and shorter as the number of passages of the virus increases, until, at the end of a hundred of the successive inoculations, it has gone down first to seven days, and finally to six. At that point it remains stationary, the rabic virus seeming then to have attained its maximum virulence for that animal (the rabbit), and the virus is said to be "fixed." It is from this "fixed" virus that M. Pasteur obtains his vaccine for Rabies by a process similar in several details to that already used for attenuation in Chicken Cholera, Swine Fever, and Anthrax.

If in a bottle with an upper and lower tubulure, containing below fragments of caustic potash and closed by a piece of cotton-wool, there is placed a spinal cord of rabbit which has served in a passage series of inoculations, this cord, which contains a quantity of "fixed" virus, gradually dries, preserved from dust and exposed to the contact of the air, at a temperature of 25° C., care being taken to keep it at this point. If each day we take a small quantity of this cord and inoculate on the surface of the brain of a rabbit, we shall perceive that as the cord becomes dry in the sterilised warm air so it loses its virulence. At the end of five days' drying, it will only be capable of killing some few of the rabbits who have received it. At the end of fourteen days we find it absolutely innocuous, after having passed down the scale of gradually diminishing activity during the preceding days.

Having now obtained our material containing the attenuated virus, if we each day inject subcutaneously into a dog a portion of the attenuated cord, crushed in water, taking care to begin the injection with the harmless fourteen days' cord, to go on on the second day with the thirteen days' cord, then the third day with the twelve days' cord, and so on till we reach the cord at zero, or, in other words, spinal cord unattenuated, spinal cord which is deadly, this dog thus inoculated will not die, nay more, we may try him with the most active rabic virus inoculated into the brain and he will remain perfectly well, though we know that otherwise intracranial inoculation produces Rabies without fail. There is, therefore, positive proof that the injections of the dried cord have produced exemption from the disease. The experiment may be repeated as often as you please, but the results remain the same. Dogs which have subcutaneously received the series of cords commencing from the fourteenth day cannot take the disease either from the bites of mad dogs or in any other way. The exempt condition has been obtained in one fortnight.

Usually Rabies remains latent in a dog which has been bitten for a period generally exceeding one month. It might therefore be possible to profit by this long incubation period to give before its manifestation exemption from the malady. To elucidate this point, out of a number of dogs bitten by rabid dogs, or inoculated under the skin with rabic virus, some were preserved for control experiments, while the others were subjected to the preventive inoculation of the dried cord in augmenting degrees of virulence. Of these latter not one took Rabies, while of the former a great number died with the characteristic symptoms of the malady. It was proved possible to prevent Hydrophobia even after the bite.

Notwithstanding, however, the favourable results obtained upon animals, the application of the same method to man was undoubtedly a bold step. By what urgent solicitations and "medical advice" M. Pasteur agreed to take it is a matter of history. In July, 1885, the boy Meister, terribly bitten by a rabid dog, was the first to undergo the anti-hydrophobic inoculation.

It is a noteworthy date, and marks an epoch, not only in the history of the laboratory of M. Pasteur, but in that of Science herself. I shall not dwell upon that which is well known; how, after this first successful attempt, persons bitten came to the laboratory from all parts, nor how, since then, each month about 150 persons come to obtain the anti-rabic inoculations. Some among you have been present at these inoculations, and have seen how the emulsions of dried—that is, attenuated—cord are prepared to avoid the introduction of any alien germs. The injections are made in the side, on the right and left alternately, and are repeated during fifteen days. For ordinary bites the inoculations start with the fourteen days' dried cord, and end with that of three days. For more dangerous wounds, those of the head and face, the number of inoculations is greater, and we proceed to the more recent cords more quickly, as it was soon discovered that these last-mentioned kinds of wounds required a more active treatment.

Since the commencement of the inoculations until now (March 21st, 1889), 6,870 persons have been treated in the Paris institute alone; and among them many were very severely wounded. The proof of the rabidity of the animal which gave the bite has been furnished either by experiment or by veterinary examination in 80 per cent. of the cases. The mortality among the persons bitten by indubitably rabid dogs and thus treated is about 1 per cent., a very low rate if compared with that of 15 per cent. which usually follows the bites of mad dogs. It is scarcely credible that this extremely small number of failures should have given rise to such violent attacks against this practice; the most contradictory accusations have been brought against it. It was declared to be inefficacious, that its good results were obtained by the treatment having been applied almost entirely to persons bitten by healthy dogs, that the statistics showed that as many persons had died in France of Rabies since the introduction of M. Pasteur's system as before it. This last assertion was made by badly-informed persons, who took for complete statistics documents allowed to be insufficient even by the very individuals who published them. The proof of the efficacy of the system is to be found by examination of those cases where the rabidity of the attacking animal was incontestably, because experimentally, proved; and above all, from such of these cases as were bitten on the head and face. In this latter class alone, it is well known that the ordinary mortality is 80 per cent., whereas among those treated at the Pasteur Institute the mortality does not reach 4 per cent.

Other adversaries asserted that the treatment was dangerous, and increased the probability of death, and thus found themselves confronted with the singular paradox of a dangerous treatment enormously diminishing the death-rate of the disease, and with their previous assertion that the inoculations produced no result whatever. These last opponents were furnished in support of their contentions with the violence of their assertions alone, as they had made no experiments whatever.

Others followed, however, who contended that they had proved by experiment that the foundations themselves of the system were unsound, and that the anti-rabic inoculations could not give immunity to dogs. The fate of these pretended experiments is well known to you. They were shown, on unquestionable authority—that of the English Commission charged with the inquiry into the inoculations—to be inexact. You know, gentlemen, of whom this Commission was composed,* and in order to answer once for all the whole series of attacks, it is only necessary to recall their judgment as embodied in their report—namely, that M. Pasteur had discovered a method

* The members of the Commission were Sir James Paget, Sir Joseph Lister, Drs. Brunton, Fleming, Quain, and Burdon Sanderson, Sir Henry Roscoe, and Mr. Horsley (Secretary).

of prevention against Rabies comparable to that of Jenner against vaccination. The absolute nullification of fatal results among persons bitten by mad animals and treated I do not, however, believe to be possible.

Nearly all the individuals treated who have succumbed to the disease developed it during the fortnight following the commencement of the inoculation, owing to the fact that in their case the virus passed probably by the blood-stream to the nervous centres immediately after the bite. Indeed, experience shows that the disease may break out from the first (?) to the eighteenth day after inoculation, and it also demonstrates that in cases of submeningeal inoculation it is extremely difficult to outstrip the disease, because the inoculation period is so short that attenuated cord inoculated subcutaneously and far from the central nervous system has no time to do its work. In such cases, therefore, of extremely short incubation period, it is possible that the treatment may fail. Fortunately, they are rare, even where the bites have been received in the face. As for the few cases which succumb even where the treatment has been completed and has apparently had sufficient time to produce its effects, it is extremely difficult to assign the true cause of such failures, but they may perhaps depend upon the special liability of the individuals in question.

The most remarkable point, however, in the whole discovery of this preventive inoculation against Rabies is that it has been carried out, the virus itself being still unknown. Not only do we not know how to cultivate it outside the body, but, in allowing it to be really a microbe, we can but do so by analogy, for as yet no one has been able to isolate it. Notwithstanding this, however, it is daily being attenuated and made to pass through the various stages of virulence. Unable to cultivate the organism artificially in flasks and tubes, M. Pasteur has been obliged to do so in the rabbit, and so easily and with such perfect regularity are these cultivations in the living animal performed that they are ready each day for use in the inoculations at a specified time and in the condition of genuinely pure cultivations. There is no stronger example of the power of the experimental method applied to medical matters than this one of the prevention of a malady the absolute virus of which is still obscure.

Certain microbes—that, for example, of Anthrax—grow with such tremendous rapidity in the bodies of animals, that at the time of their death their blood contains more parasitic elements than blood-corpuscles. The bacilli form occasionally capillary obstructions, and so act mechanically; but like all living cells, they have their vital products, and with such an enormous number of them it is easy to imagine that these very largely modify the nature of their surroundings. The bacillus of Anthrax, which is specially greedy of oxygen, draws it from the blood-corpuscles, and produces asphyxia of the tissues; but the greatest source of danger from microbes is to be found in poisonous products which they manufacture. A striking proof of this fact is given us by the diphtheritic bacillus, which, notwithstanding that it grows not in the interior of the tissues, but on the surface of the mucous membrane—outside, as it might be called, the body—yet causes death, and sometimes with a frightful rapidity. In this case there is no invasion of the body nor struggle between the cells, but simply poisoning by the products of a very active parasite growing on the border of the false membrane. It is difficult to find in the body of an animal which has just died of an infectious malady these poisonous products of which we have been speaking, as the complex surrounding of tissues is unsuitable for such researches, and the poisons being only present in very small quantities, the animal during life partly eliminated them from its system; it is therefore in the cultivations in flasks and tubes that we must endeavour to find these products of the pathogenic activity of the microbes.

The first experiments made on this subject were originated by M. Pasteur. In order to find out what the action of the products of the Cholera microbe really was upon fowls, M. Pasteur injected into them a large quantity of a culture which had been absolutely purified from the microbes by filtering it through porcelain. The fowl into which this liquid, absolutely free from living virus, was injected, became sleepy, its wings hung down, its feathers stood up, and in fact for several hours it displayed all the symptoms of the disease, after which it recovered. We thus see that the chemical products obtained during cultivation of the microbe are able of themselves to cause the symptoms of the disease, and it is therefore very probable that they are really manufactured by the microbe in the body itself of a fowl attacked by Cholera. It has since been shown that many of the pathogenic microbes manufacture these poisonous products, and the microbes of Typhoid Fever, Asiatic Cholera, blue pus, acute experimental Septicæmia, and of Diphtheria, all belong to this class. The cultivations of the bacillus of Diphtheria in particular become, after the lapse of a certain time, so charged with the poisonous substance that an infinitesimally small dose of it causes death to the animals, with all the characteristic signs observable after inoculation with the microbe itself, no one sign being wanting to complete the resemblance, even down to the gradual encroachment of paralysis where the dose has not been sufficiently strong to ensure a speedy death. In infectious maladies, therefore, the cause of death is poisoning, and the microbe is not merely the means of spreading infection, but is also the maker of the poison.

By introducing little by little into the bodies of animals these chemical substances produced by pathogenic microbes, such, for instance, as that of acute Septicæmia, in such a manner as to avoid causing speedy poisoning, but so as to gradually accustom the animal to its presence, it becomes refractory not only to toxic doses, which would have originally caused death, but also even to the microbe itself; and the immunity which hitherto we could only give by the introduction of a living virus into the body we can now effect by the introduction of a chemical substance into the tissues, and these vaccine substances are exactly those which we have observed in infectious diseases as being the cause of death. In large quantities they kill, in small they confer immunity. These experiments on vaccination by means of soluble substances without microbes have been successful in various maladies, and we may be allowed to hope that their field of utility will become much wider.

I would here recall to you the works of Salmon, on Cholera; of Toussaint, Chauveau, Wooldridge, Chamberland, and myself, on Anthrax; of Charrin, on the Pyocyanic Bacillus Disease; Chamberland and myself, on Acute Septicæmia; Beemer, Brieger, Chantemesse, and Vidal, on Typhoid Fever; and of myself on Symptomatic Anthrax, which have established the principle of vaccination by chemical substances; so that we now see it may be possible to protect ourselves from one malady by means of another, for which purpose it is only necessary that the microbes of the two maladies should manufacture similar chemical substances. The question now arises, Has the animal, the recipient of a sufficient dose of these products, become refractory in consequence of their being present in the tissues, and thus preventing the growth of the microbe? Upon this point, while we do know that in cultivation the growth of certain microbes is arrested by the accumulation of the products which they form there, we must carefully avoid forming a definite opinion as to what happens in the living body upon the basis of phenomena which have been observed to take place in culture tubes. For example, if we take a little blood from a sheep which has been rendered refractory to Anthrax, and place in it Anthrax bacilli, they will grow there

rapidly and abundantly, thus showing that there is in the blood of this protected animal no substance capable of destroying the life of the bacteria. This experiment is, of course, an extremely crude one, since from a chemical point of view there is an enormous difference between blood while still retained within the living vessels, and the same blood drawn from the body and placed in a culture flask. If any positive result were obtained, it could only be from an absolutely enormous chemical change in the composition of the tissues.

A more delicate experiment may be performed by injecting into the anterior chamber of the eye of a protected sheep a few virulent bacilli, which, while growing well in the aqueous humour, will confine themselves to that special spot. It is, therefore, evident that in this aqueous humour, notwithstanding its being a part of the animal, and consequently, of necessity, participating in its chemical modification, there is no substance present capable of resisting the local development and vital activity of the Anthrax bacillus.

Besides the chemical, we have also the physiological question to deal with, as may be seen from the following experiment. If the virus of "quarter evil," that is, *charbon symptomatique*, be injected into the thigh of a rabbit, an animal which is by nature refractory to the disease, no characteristic tumour will develop, and its immunity appears to be absolute. But if now any lesion be first produced in the tissues, either by a blow or by the injection of some caustic substance, and the inoculation be made at that point, then an Anthrax tumour will soon appear, and the rabbit, though habitually exempt from the disease, may chance in this manner ultimately to succumb to it, the reason being, of course, that the injured tissues have formed an inert soil for the microbe to start its growth without hindrance. The immunity, therefore, of a rabbit from "quarter evil" does not arise from its possessing in its body any simple chemical substance inimical to the cultivation of the virus, as we see that it is only by artificially causing necrosis of the tissues that the virus is able to gain a footing in it.

What, then, does happen on the injection of active virus into an animal which is refractory? What becomes of the microbes? M. Metschnikoff has taught us that they are soon destroyed, and that the foremost agents of the destruction are the white corpuscles or phagocytes, which swallow up the microbes and digest them; while, on the other hand, the white corpuscles in the bodies of non-refractory animals do not swallow the microbes, or that, if they attempt to do so, the latter develop notwithstanding.

Any satisfactory explanation of the problem of immunity should comprise all these facts, and should be based upon the relative importance of the action of the chemical products and the resistance of the tissues. I believe that the best explanation, in fact, consists in considering immunity as the result of the habituation of the cells to the poisons secreted by the microbes.

When the virus begins to develop in the body of an animal subject to the malady it forms its poisons, and when the white corpuscles begin to struggle against them their activity is arrested by this toxic production. The microbe continues to develop and the malady progresses. But in the case of an animal rendered refractory by previous injection of the soluble substances or by inoculation of attenuated virus, the corpuscles have already got accustomed to the microbic poison, and since the small doses given at the beginning of the cultivation ot the virus do not impede their activity, they commence the struggle and devour the parasites. But if, as in the experiment with "quarter evil," some cause should prevent this corpuscular intervention, the cultivation of the microbe would succeed, and in this local centre there would soon be a sufficient quantity of poison to render the corpuscles powerless, notwithstanding that these have been previously accustomed to it, or possess natural powers of resistance against it.

There is no means of habituating the system to large doses. It is therefore in the time immediately following inoculation that the decisive battle is waged. Hence the great importance of clearly understanding the importance of the condition of the seat of inoculation, and of the quantity of virulent matter introduced. When once we are thoroughly acquainted with these poisonous substances formed by pathogenic microbes, we shall perhaps be in a position to find antidotes for them capable of paralysing their action even within the tissues themselves; but in offering this suggestion I perceive that I have deserted the domain of fact for that of hypothesis, and that it is therefore time I drew my remarks to a close.

It seems to me that the foregoing view of this wide question reconciles the various works upon it, which have been multiplied in the last few years, and though it is possible that it may be modified by time, one thing will remain unchanged, and that is the gratitude of all to him who by his studies of attenuated viruses and preventive vaccinations has enabled us to deal successfully with that problem of immunity which has hitherto remained impenetrable.

THE PHYSICAL CONDITION OF HORSES FOR MILITARY PURPOSES.*

BY GEORGE FLEMING, ESQ., C.B., LL.D., F.R.C.V.S., PRINCIPAL VETERINARY SURGEON OF THE ARMY.

THE subject which I have the privilege and the honour to introduce to your notice to-day, is one of much interest and importance to all who have to do with horses, whether in the Army or out of it; but more especially does it concern those who belong to the mounted portions of our forces; as upon their acquaintance with it, even to the smallest details, will, to a large degree, depend the efficiency and value of their different corps in peace or in war. And nowhere, perhaps, could such a subject be more fittingly introduced and discussed than in this great centre of our military life, where theories can be tested and knowledge practically applied in all that pertains to the successful utilisation of troops, whether mounted or dismounted. Here, at Aldershot, we have at all times, and in all seasons, a larger number of horsemen and horses than are located in any other part of the United Kingdom; and the training which they undergo, and the tests and fatigues to which they are exposed, brings them nearer to a realisation of what actual warfare is, and what it demands from man and horse, than any other ordeal to which they could be subjected, short of war itself.

The value of horses in land wars is so well recognised, that it would be sheer waste of time to refer to it; but the value of studying their special aptitudes, their fitness for particular services, and how to obtain and maintain this fitness, is not always sufficiently considered; and when this is the case, there is danger that the advantages and benefits which should be derived from them will be only partially available or altogether lost. Whereas, with a good selection of horses for certain services, and judicious management of them, we may derive all that they can yield to man in the performance of the most onerous and severe tasks which may be imposed on them.

How horses can be best and most economically utilised in the Army, is a question which needs the most careful examination; not only because upon the results of it may depend the success of operations in the field, but also because of the increasing difficulty experienced in procuring, in a brief space,

* A lecture delivered before the Aldershot Military Society on January 31st, Major-General Philip Smith, C.B., in the chair.

a sufficiency of horses to complete Army Corps, and replace the heavy losses which are generally inevitable among them on active service. It is this question which I venture to bring before you now; and though I feel as if I owe an apology for my temerity in submitting to you views which can have nothing in the way of novelty in them, yet there may be points which will merit discussion, and differing opinions which it may prove beneficial to reconcile, so as to lead to amendment and improvement in horse management.

The physical fitness or condition of horses for military purposes depends upon several factors, the more important of which may be enumerated as:—

1. Size and breed of horses for special services.
2. Food, with regard to quantity and quality.
3. Care and management.
4. Amount of work exacted.
5. Manner in which the work is exacted.

1. Size and Breed of Horses for Special Services.

There is not much need to insist upon the necessity for our horse supply being of the best possible quality, and well adapted in every way to the requirements of the different branches of our mounted corps. Our country is pre-eminent for its breeds of light and heavy horses, and we should, therefore, expect that our army horses would excel those of any other nation. I think it is questionable if our superiority in this respect is so marked as it ought to be, or if, with regard to at least one army, it exists at all. Perhaps our draught horses have improved somewhat, but we may entertain doubts whether the Cavalry horses have gained much in size and quality during the last quarter of a century. Calling to mind the kind of horses upon which Cavalry soldiers were mounted some thirty or forty years ago, one would feel inclined to express a doubt whether they are so good now as they were then. The opinion might be ventured that the modern system of racing has not proved beneficial to Cavalry horses; and looking through the different regiments, and comparing the past with the present, we fancy we can see the effect of five furlong races upon the troop horses of to-day.

Several things conspire to render these horses less suitable than in former times. Race horses were not bred for short races, but for trials of endurance as well as speed, and as it is to the race horse that we generally owe improvement or deterioration in our light horses, as he deteriorates in size and endurance, so will our Cavalry remounts to a large extent. Again, before the advent of railways, in the days of stage and mail coaches, and when travellers and farmers thronged the roads on horseback, strong good-paced animals, well adapted for Cavalry, were common; now this stamp of steed is almost unknown. Therefore it is more difficult to obtain horses physically fit for Cavalry purposes now than formerly; and though, perhaps, they may show what is termed "Breeding," yet considering what they have to do on active service, grave doubts may be entertained whether they have sufficient bulk and strength to sustain the trials which they would have to undergo.

It is possible that the steps now taken to improve the lighter breeds of horses throughout the United Kingdom, may, in the course of time, give us something like the old-fashioned Cavalry horse, fit to sustain successive days of movement under a heavy load and on short rations.

If it be accepted as a fact that our Cavalry remounts are, physically, not so good now as they were half, or even a quarter of a century ago, we certainly do not make amends for this by the way we treat them. Many are in the ranks doing hard work before they are five years old; and this is not con-

ducive to their soundness or development. It would be in every way better for them if they were not compelled to undergo the fatigues of mature horses until they were five, or even six years of age, and perhaps it would be more profitable to the public. Almost every Cavalry regiment has a number —some of them a large number—of horses too young for service, physically unfit, in fact; and if they were sent into the field they would probably succumb in a short time. Such regiments, though shown as up to their full establishment in horses on paper, are, therefore, not so; they are deficient in proportion to the number of young and old horses in the ranks. If it could be ordered that no horse should be considered physically fit until he had reached at least five years of age, then the casting period on account of age might be extended to eighteen years. Horses do not reach maturity—that is, the maximum of physical fitness—until they are seven or eight years old. When hard worked too soon, they are often worn out by that time; whereas, when allowed to attain their full growth and strength before they are severely tried, they might be able to perform good service up to even twenty years.

Of course, I am speaking of horses which are fairly well bred, of good conformation, in robust health, vigorous and active. It is all important that the army should have such horses. Under-bred animals, whether for draught or saddle, though large enough, are soft in fibre and weak-hearted; they are unable to resist exposure and fatigue, and cannot be trusted on an emergency.

Associated intimately with physical fitness is "Pace." All military horses ought to be smart in movement, and of all the paces which should be found in perfection in them, walking is the one. Good walking, whether in carriage or saddle horses, should be considered as absolutely essential. Though Cavalry horses should also trot and gallop well, yet quick walking is as great a desideratum in them. There is much more of this pace on service than of galloping, and it is perhaps the most trying; it is the pace which, according to an old Cavalry General, "destroys more horses than do the enemy's bullets."

A horse, then, which may be considered physically fit, if of proper size and conformation for the service he is to perform, should be one which looks bright and lively, walks and trots sound and freely, has a shining coat, hard muscles, and eats, drinks, and rests well.

This physical fitness we should find in greatest perfection in our fast-moving horses—in Cavalry and Horse Artillery; for it is upon them that the severest strain is imposed, as they have to move at all paces, and to cover more ground than the heavier horses which generally move at a uniformly slow pace, and have their loads carried upon wheels. In modern warfare the duties of Cavalry will be heavier than in former days, and the brunt of the fatigue will fall upon the horses. Consequently, these horses cannot be too good. Nearly a century ago, a high authority on this branch of the service, when insisting upon the necessity for Cavalry arriving in a fit state on the field of battle, said: "A feeble, delicate horse, shaken by the constant weight it has to carry, and by bad and insufficient food, will be less certain to arrive than a powerful and robust one; or if it does reach the spot, it is exhausted at the very moment when it has need of all its strength. The rapidity of a regiment in the field depends upon the speed of its slowest horses; so that a horse should be able to go at an average gallop."

2. Food: Quantity and Quality.

With regard to food in its relations to physical fitness, we all know that this should be sufficient in quantity, and good in quality; but a fact not often recognised until too late, is that it should also be food to which horses are accustomed.

The quantity should, beyond a certain allowance, be in proportion to the amount of work performed, and perhaps also to the season. In our army,

there is a uniformity in this matter which reduces the question of feeding to the greatest simplicity, though it must be confessed that it is not in harmony with reason or experience. The forage ration is never varied all the year round, no matter how young or how old the animals are, how heavy or how light the work may be (with one or two exceptions to be presently mentioned); and large horses weighing 1,200 or 1,400 lbs. receive the same quantity as those weighing 800 lbs. This ration is, as you are aware:—

If in quarters, oats 10 lbs., hay 12 lbs., straw 8 lbs.
If in encampments, oats 12 lbs., hay 12 lbs.
If employed on draught work, 2 lbs. oats extra.

The extra issue is allowed to horses of the Army Service Corps drawing waggons at a trot; and during the winter months only, for all other draught horses when employed on continuous draught work for a period of at least five hours a day.

An extra issue of 2 lbs. of oats, in addition to the ordinary ration in quarters or in encampments, is allowed to draught horses of the Army Service Corps when these are 16 hands high and upwards.

In Continental armies, the allowance of forage is systematically adjusted to the size of all the horses and the nature of their work.

In the German Army, for instance, there are four scales of forage rations, the difference between them consisting chiefly in the amount of oats. There is, first, the heavy ration, which consists of 11 lbs. 7¾ ozs.; second, the ration for Light Cavalry of the Guard, which is 10 lbs. 15 ozs.; third, the medium ration, which is 10 lbs. 11½ ozs.; and fourth, the light ration, which is only 9 lbs. 13½ ozs.

The allowance of hay is 5 lbs. 7½ ozs., and of straw 7¼ lbs. 10½ ozs.

These rations are issued as follows:—

The heavy ration is allowed to horses of General Officers, the General Staff, Adjutants, Officers of the War Ministry, Cuirassier and Guard Lancer Regiments, Military Riding School, Guard Horse Artillery and Field Officers of Guard Field Artillery, all Artillery draught horses, those of the Gendarmerie and Intendance, and Transport draught horses. Troop horses of the Gardes du Corps Regiment receive at all times 1 lb. 1½ ozs. of oats, and 3 lbs. 4½ ozs. of hay extra.

The second scale is given to the Light Cavalry of the Guard, Guard Dragoons, and Guard Hussars.

The medium ration is for the Lancer Regiments of the line.

The light ration is for all other troops and the horses of officers not specified.

The above are termed the "Garrison Rations," and are only drawn for horses on the strength; the three or four extra horses in each squadron, battery, and company of Transport, have to be fed on what can be saved from the forage of the others. It is not compulsory to give the horses their full rations daily, but a portion may be reserved for times when work is heavier than usual.

On the line of march the ration is increased as follows:—

Heavy ration to 13 lbs. 3⅜ ozs. oats.
Light Guard Cavalry ration to 11 lbs. 7¾ ozs. oats.
Medium ration to 11 lbs. 4¼ ozs. oats.
Light ration to 10 lbs. 6¼ ozs. oats.

The heavy ration of oats is accompanied by 3 lbs. $4\frac{9}{10}$ ozs. each of hay and straw for feeding; the other rations having 3 lbs. 4 ozs. of hay, and 3 lbs. 13¼ ozs. of straw for the same purpose, as litter is provided in the billets.

In the field this ration is increased all round by 8¾ ozs. of oats, each horse then carrying what is called "the iron ration of oats"—nearly 14 lbs. the

heavy ration, over 12 lbs. the second, 11 lbs. 13 ozs. the third, and 11 lbs. 1 oz. the light ration.

During railway transport, each horse is allowed 3 lbs. 4½ ozs. of hay, and 2 lbs. 3 ozs. of straw to lay on the floor and ramp of the waggon. If the journey lasts longer than eight hours, 6 lbs. 9 ozs. of hay is allowed extra for every twenty-four hours.

During Army Corps manœuvres and Cavalry Division exercises for a period of four weeks, the following rations are allowed:—

For Cuirassiers or Horse Artillery draught horses, 12 lbs. 14½ ozs. oats.

For other Line Cavalry Regiments and Horse Artillery riding horses, 11 lbs. 7½ ozs. oats.

As on the march, 3 lbs. 4 ozs. of hay and 3 lbs. 13½ ozs. of straw are allowed. (*To be continued.*)

Proceedings of Veterinary Medical Societies, &c

ROYAL COLLEGE OF VETERINARY SURGEONS.

SPECIAL MEETING OF COUNCIL, HELD JUNE 4TH, 1889.

Professor PRITCHARD, President, in the Chair.

Present—Professors J. W. Axe, W. Duguid; General Sir Frederick Fitzwygram, Dr. Fleming, C.B., Sir Henry Simpson; Messrs. J. D. Barford, T. Briggs, E. C. Dray, J. Roalfe Cox, B. Cartledge, T. Greaves, H. Kidd, W. J. Mulvey, H. R. Perrins, J. F. Simpson, Peter Taylor, W. Wilson, W. Woods, F. W. Wragg; Mr. Thatcher, the Solicitor; and Mr. A. W. Hill, Secretary.

The SECRETARY read the notice convening the meeting.

Mr. PETER TAYLOR moved that the minutes of the previous meeting be taken as read.

Mr. KIDD asked, under Bye-law 8, that the minutes should be read.

Dr. FLEMING said that the minutes had been published in the journals, and that for a great number of years it had been the custom of the Council to take them as read.

Mr. J. F. SIMPSON said that, being perfectly acquainted with the minutes of the previous meeting, he expressed no wish one way or another, but he would ask whether it was not a fact when any member of the Council desired the minutes to be read that they must be read.

General SIR FREDERICK FITZWYGRAM said that it was quite insufferable to have the time of the Council wasted in such a manner.

The minutes of the previous meeting were then taken as read and confirmed.

Election of President.

Professor DUGUID proposed that Professor Axe be elected President for the ensuing year. Professor Axe was so well known that it was needless to make any comments upon his qualifications for the office; and he was the oldest member of the Council who had not hitherto filled the presidential chair.

Mr. B. CARTLEDGE seconded the motion.

Mr. GREAVES said that several members of the Council, including himself, had wished to propose another gentleman as President, namely, Mr. Peter Taylor; but out of respect to Professor Axe, and with the desire that the vote should be a unanimous one, no other gentlemen would be proposed. No one could find the slightest fault with the action that had been taken, but the provincial veterinary surgeons felt somewhat aggrieved that so many metro-

politan practitioners and professors should occupy the highest position which could be conferred upon them. He hoped that in future the provincial practitioners should have the honour of electing a President for the Council, if not every other year, at all events more frequently than they now had. Mr. Taylor had been a member of the Council for a great number of years, and he hoped it would be understood that he would be eligible for the office of President next year.

Mr. B. CARTLEDGE said that if Mr. Greaves had any other candidate to propose, the Council were bound to listen to him, but he thought Mr. Greaves was entirely out of order in making such comments.

The PRESIDENT thought it might be taken that Professor Axe was unanimously elected.

Mr. B. CARTLEDGE thought the Council were bound to elect the President by ballot.

Sir HENRY SIMPSON ventured to submit that it was not necessary to ballot, as only one candidate had been proposed.

The motion for the election of Professor Axe as President was then put and carried unanimously.

The PRESIDENT, in congratulating Professor Axe on his election, greeted him to the chair as President for the coming year.

Professor AXE then took the presidential chair.

The PRESIDENT (Professor Axe) said that he appreciated very much the honour that the Council had been pleased to confer upon him. It was natural that one should look forward to occupy the position which so many worthy men had previously occupied. It could not fall to the lot of all, but it might fall to the lot of those who, in their aims and objects, had striven to obtain a high position in the profession. He recognised in their choice of President for the coming year that the Council saw in him one who had aimed at, if not altogether attained to, a high position in their ranks. It had been suggested that perhaps no important measure was likely to come before the Council during the coming year, but he hoped that prophecy would not be realised. Both in the system of teaching and of examining, and indeed in their scientific position, they were only in their infancy, and there was a great deal to be attempted and achieved in the future. It would not do to sit down and be satisfied with things as they were; and he should take it as an ill omen if measures of considerable importance were not brought under their consideration during the year of office on which he was now entering. The profession was becoming more and more alive to the necessity of progress, and it was beginning to recognise the means and methods of progress. There were some difficulties still in existence with regard to the examination of students. They had been told that there was a want of uniformity in the preliminary educational examination. He did not know how far that might be true, but it was desirable that the Council should at least endeavour to remove every suspicion of irregularity in a matter of such moment. It had also been pointed out that the professional examinations were still incomplete, and would continue to be so until a written test was instituted. For himself, he believed that a written test would not only be a great advantage to the student, but a great advantage and security to the examiners; as well as a means by which other important objects could be achieved. The examinations, he thought, sooner or later, would have to be considerably broadened in another direction. The time was not far distant when students would be required to be submitted to a clinical examination, which, he thought, would not only be an incentive to them to become more observant, and necessarily more intelligent, but it would have the tendency to advance the future of the profession. The time had also arrived, he believed, when the question of sanitary science should form part of their system of teaching and examining.

That had been too long disregarded, considering the important nature of the question as it affected our herds, flocks, and studs at the present time. Another point of importance was the practical training of students. It had from time to time been suggested that the means possessed by the schools was insufficient to give students the extent and breadth of practical instruction which it was necessary to possess in entering upon the duties of their profession. He agreed with what the representatives of the schools had from time to time admitted, namely, that it was incompetent for them to make practical veterinary surgeons. It would be for the Council to map out some scheme by which more practical information could be obtained by the student prior to his submitting himself to the final examination. It had occurred to him that perhaps they might reasonably insist upon students devoting their vacation to practical work with veterinary surgeons in practice, before being admitted to the final test. If the eight months at their disposal between the sessions were devoted to that work, a great step would be made towards their advancement. Those, he thought, were some of the practical questions which might usefully be brought before the Council. Although he felt that he might not be able to discharge the duties which devolved upon the President as well as he could wish, he looked forward to that united assistance which members of the Council had always readily conceded to his predecessors on every occasion when difficulties arose in the business of the College. He hoped by their help to accomplish the task of maintaining the dignity and honour of the position which had been entrusted to him.

Election of Six Vice-Presidents.

The names proposed for the election of six Vice-Presidents were as follows:—Messrs. Dray, Woods, Lambert, Briggs, Banham, Walters, Hunting, Blakeway, Wilson, Headley, and Walker.

The ballot was then taken, with the following result:—Mr. Dray, 14 votes; Mr. Woods, 13; Mr. Briggs, 13; Mr. Wilson, 13; Mr. Lambert, 11; Mr. Hunting, 9; Mr. Walters, 8; Mr. Banham, 7; Mr. Blakeway, 5; and Mr. Headley, 5; and Mr. Walker, 2.

Messrs. Dray, Woods, Briggs, Wilson, Lambert, and Hunting were declared to be elected as Vice-Presidents.

Retirement of Treasurer.

Mr. DRAY said that, owing to increased failing health, he was sorry to inform the Council that he felt compelled to tender his resignation as Treasurer. It was with great pain that he made the statement, for he should never forget the great kindness which had been extended to him by the Council. If he should not be thought dictatorial, he would suggest Mr. Wragg as his successor. Mr. Wragg lived in the neighbourhood, and was a gentleman well qualified to perform the duties.

Mr. J. F. SIMPSON said that it was with great regret that he listened to Mr. Dray's announcement. If the Council should decide to accept Mr. Dray's resignation he should have great pleasure in supporting the suggestion that Mr. Wragg should be appointed as Treasurer.

Dr. FLEMING said that last year Mr. Dray had made a similar proposition, but had been induced to retain office with the offer of assistance if necessary. Mr. Dray had been Treasurer so long, and their finances had prospered so well in his hands, that he feared without him as the frontispiece of their financial position the Council would not feel happy. If Mr. Dray would allow his name to be retained as Treasurer he felt sure that Mr. Wragg would gladly render him any assistance that might be necessary. If Mr. Dray could accede to that request it would be a great pleasure to the Council.

Mr. F. W. WRAGG hoped that Mr. Dray would still act as Treasurer, and any assistance that might be in his power to give he should only be too delighted to render.

Mr. DRAY, in thanking Dr. Fleming for his kind remarks, said that if it had not been for Mr. Wragg saying that he was willing to offer assistance should he be absent from ill health, under no other circumstance would he be induced to remain in office. He thought that, generally speaking, a person should not accept office unless he filled the duties to the letter, but if he (Mr. Dray) failed to do so the Council must take the will for the deed.

Election of Secretary and Registrar.

Mr. DRAY moved the re-election of Mr. Hill as Secretary and Registrar. He had no occasion to comment upon how well Mr. Hill had performed his duties, for they spoke for themselves. He was sure the Council would be delighted to re-elect him.

Professor PRITCHARD said he had great pleasure in seconding Mr. Dray's proposition. He would like to take the opportunity of thanking Mr. Hill for the way in which he had acted as Secretary during his year of office. He had known Mr. Hill ever since he had been Secretary, but of course he had come into closer contact with him during the past twelve months than he had done before, and he could only say that he had found everything in Mr. Hill in the shape of assistance that he could possibly desire. If he were permitted to give his successor to the chair a hint, he might tell him that he would be very well waited upon, and that he might rely to a very considerable extent upon the services of the Secretary.

The motion was unanimously adopted.

Mr. A. W. HILL (Secretary) acknowledged the kind sentiments which had been expressed towards him. His best endeavours would be always to carry out the wishes of the Council. The work naturally increased year by year, but with their kind assistance all the difficulties would be mastered. He thanked the Council most sincerely for his re-election.

Vote of Thanks to the retiring President.

Dr. FLEMING said that it was with great pleasure that he rose to pass a vote of thanks to the retiring President, Professor Pritchard. The duties of the President were heavy, and if they were not numerous they were sometimes extremely pressing. During recent years these duties had become still more onerous, owing to the number of committees which were sitting, and therefore the tax upon the time, patience, and judgment of the President was a serious one. During the past year they had been fortunate in having a President who had been able to attend all the Council and the Registration Committee meetings. He thought from the manner in which Professor Pritchard had discharged his duties, firmly, generously, and kindly, that he commended himself to the Council as deserving a hearty vote of thanks. He had much pleasure in proposing that the retiring President be awarded a vote of thanks for the manner in which he had conducted the duties of the chair during the past year.

Mr. BARFORD, in seconding the motion, referred to the courtesy and urbanity with which the chair had been filled during the past year, which, he said, reflected considerable credit and honour to their past-president.

The motion was unanimously agreed to.

Professor PRITCHARD, in acknowledging the compliment, thanked the Council for the kind expressions of opinion with reference to the way in which he had filled the chair during the past year. As Dr. Fleming had said, there had been plenty to do to occupy both mind and time. From the

first moment he had the honour of occupying the chair the work had been a labour of love, and if he had succeeded in gaining the good opinions of the members of the Council he felt fully repaid for any little time and trouble he might have spent in carrying out the duties of his office.

Notice of Motion.

Mr. WILSON stated that on a subsequent occasion he should give notice that he intended to call attention to pages 60, 61, and a portion of 62 of the bye-laws in connection with the regulations of the examination of students before they entered.

On the motion of Mr. Dray, seconded by Dr. Fleming, a vote of thanks was passed to the President, Professor Axe, for his conduct in the chair.

EXAMINATIONS OF THE ROYAL COLLEGE OF VETERINARY SURGEONS.

AT meetings of the Court of Examiners held in Glasgow and Edinburgh on and between May 21st and 30th, 1889, the following gentlemen passed their Final Examination, and were admitted Members of the Royal College of Veterinary Surgeons:—

Glasgow Veterinary College.

Mr. H. Ross	Invergordon, Ross-shire.
„ J. W. Pealt	Rockavy, Monaghan.
„ W. Smyth	Katesbridge, Co. Down.
„ H. J. Windsor	Govan, Glasgow.
„ C. B. Freeman	Dublin.
„ D. C. McCambridge	Randaltown, Co. Antrim.
„ J. Gregg	Dromara, Co. Down.
„ J. R. O. Reali	Cashel.
„ M. Wilson	Mendota, Illinois, U.S.A.
„ D. Wamock	Glasgow.
„ J. Graham	Londonderry.
„ R. Anderson	Glasgow.
„ R. K. Hart	Glasgow.

Dick Veterinary College, Edinburgh.

Mr. H. G. Rodgers	Leicester.
„ F. Barling	Ross, Herefordshire.
„ F. J. S. Clarke	Gosport, Hants.
„ P. Connacher	Perth.
„ J. Christy	Limerick.
„ A. Dowdall	Liverpool.
„ F. T. Finney	Newcastle-on-Tyne.
„ R. W. Glaister	Cockermouth.
„ J. R. Jones	Hackelstown, Carlow.
„ C. B. Langran	Cork.
„ John Lyons	Mallow.
„ J. Manuel	Edinburgh.
„ J. C. McAleer	Stewartstown, Tyrone.
„ H. G. Mottam	Redford, Notts.
„ A. Richardson	Oxford.
„ J. G. Gilmour	Bailieborough, Co. Cavan.
„ J. C. Rowlands	Oswestry.
„ A. S. Wallace	Arbroath.
„ C. D. Watkins	Tredegar, Monmouth.

New Veterinary College, Edinburgh.

Mr. J. Caldecott	Knutsford, Cheshire.
„ J. W. Schofield	Manchester.
„ A. Reah	Preston.
„ W. Wright	Kelso.
„ O. T. Williams	Holyhead.
„ E. Kellett	Ruthin, Wales.
„ E. H. Curbishley	Stockport.
„ A. D. Minor	Manchester.
„ R. D. Davidson	Watten, Caithness.
„ F. Hutchinson	Howden, Yorks.
„ W. Eaton	Melton Mowbray.
„ J. W. Rider	Richmond, Yorks.
„ W. A. McDougal	Jedburgh.
„ W. F. Shore	St. Boswell's.
„ W. Stothert	Manchester.
„ T. M. Parker	Wigan.
„ F. Dales	Howden, Yorks.
„ J. Barker	Burnley, Lancs.
„ T. G. Duggle	Liverpool.
„ J. B. Robertson	Bradford.
„ F. Booth	Abergele, Wales.

The following passed their Second Examination:—

Glasgow Veterinary College.

Mr. P. Gillespie, G.C.	Mr. L. Crook, G.C.
„ T. Jarvie, G.C.	„ C. Squair, G.C.
„ D. Clerk.	„ W. Davidson, G.C.
„ J. Watson.	„ W. Logan, V.G.C.
„ J. Bishop, G.C.	„ A. Renfrew, V.G.C.
„ W. Ledger, G.C.	„ D. J. Austin, G.C.
„ A. Millar, G.C.	„ J. Kirk, V.G.C.
„ R. Weir, G.C.	„ J. K. Bruce, G.C.
„ W. McMurrick, G.C.	„ T. Trotter, G.C.
„ A. Hill.	„ G. Waddell, G.C.
„ P. Connoly.	„ J. Thompson, V.G.C.
„ J. K. Thompson.	„ W. Erskine.
Mr. T. Dunn.	

Dick Veterinary College.

Mr. W. J. McCartar.	Mr. E. Bowman.
„ J. Boase.	„ D. Woods.
„ R. St. John Walley.	„ J. Higginson.
„ A. C. Gray.	„ D. Stranaghan, G.C.
„ C. Carrick.	„ G. F. Ferguson.
„ J. Crone, G.C.	„ H. Kenny.
„ W. Weston, G.C.	„ A. Breakell, G.C.
„ W. Williams.	„ A. Paterson, G.C.
„ R. G. Robertson.	„ E. Goodman.

New Veterinary College.

Mr. J. Hume.	Mr. J. H. Parker, G.C.
„ J. M. Maxwell.	„ W. S. Lamont, G.C.
„ A. McGregor, G.C.	„ A. Prestwick.
„ E. Neilson.	„ R. Bell.
„ E. Murray, G.C.	„ J. Cockburn.
„ E. Fern.	„ H. H. Baker.
„ J. Brand, G.C.	

The following passed their First Examination :—

Glasgow Veterinary College.

Mr. W. Packmann.
„ R. Ward.
„ R. Campbell.
„ W. Marshall.
„ J. Neill.
„ W. Galloway, G.C.
„ J. Forrest, G.C.
Mr. J. E. Johnstone, V.G.C.
„ J. Jordan.
„ S. C. Pettie.
„ J. D. Walker, V.G.C.
„ J. Gilruth, V.G.C.
„ J. Douglas, G.C.

Dick Veterinary College.

Mr. V. Bankes.
„ J. W. Hudson.
„ J. J. Griffiths.
„ P. J. Mullane, G.C.
„ H. Eve.
„ J. A. Moore.
„ J. C. Paton, G.C.
„ W. Hamilton.
„ W. Stewart, G.C.
„ J. Davidson, G.C.
„ J. Tanish, G.C.
„ E. W. Thorburn.
„ J. Carmichael.
„ Alex. Pettie, V.G.C.
„ T. Maughan.
„ W. J. Richardson.
Mr. R. Holmes.
„ W. Pye, G.C.
„ J. Garvie.
„ W. Sturdy, G.C.
„ R. Hyde.
„ J. Loughran.
„ T. R. Hoggan, G.C.
„ J. Kerr.
„ J. Brown.
„ M. Pottie.
„ J. Pringle, G.C.
„ G. A. Thompson.
„ J. Henderson, G.C.
„ D. S. Davidson.
„ A. Burnfield.
„ C. Baxter, G.C.

New Veterinary College.

Mr. F. Argyle.
„ D. J. Elias.
„ A. Ellison.
„ C. Haywood, G.C.
„ J. Carpenter.
„ J. M. Young.
„ J. Connachie.
Mr. R. M. Pender.
„ J. Farmer.
„ M. Fitzgibbon.
„ R. Eaglesham, G.C.
„ J. H. Siddle.
„ R. E. Johnstone, G.C.
„ A. G. Todd.

At a meeting of the Court of Examiners of the Royal College of Veterinary Surgeons, held in London on and between May 14th and 17th, 1889, the following students from the Royal Veterinary College passed their Oral and Practical Examinations, and were admitted Members of the Profession :—

Mr. W. Rattee.
„ C. F. Hulford.
„ C. E. Williamson.
„ J. McJamieson.
„ W. A. Byrne.
„ W. Cakebread.
„ J. H. Bell.
„ H. Watkins-Pitchford.
„ B. J. Rees.
„ F. B. Vanderplank.
„ G. L. Harber.
„ I. Millward.
„ A. de Sueur.
„ E. W. Oliver.
„ C. J. Callow.
*Mr. E. E. Martin.
„ H. D. Chorlton.
„ J. Wilson-Barker.
„ G. T. Cannon.
„ S. Vincent.
„ C. A. Malvisi.
„ R. H. Singleton.
„ A. Porritt.
„ E. P. Owen.
„ J. Codrington.
„ F. C. Gavin.
† „ J. Golledge.
„ T. Ludlow.
„ E. D. Johnson.
„ H. H. Millward.

Mr. Thos. Slipper.
* „ J. W. Coe.
„ A. G. Seath.
„ A. Bramall.
„ I. Wilson.
Mr. F. W. Emery.
„ J. Beauland.
„ W. A. Welch.
„ G. H. Williams.

The following passed their Second Examination :—

Mr. W. R. Kennedy.
„ C. M. Robinson.
„ W. E. Brame.
„ F. H. Jenkins.
„ E. E. Stokes.
„ W. K. Stuart.
* „ F. W. Greenlaw.
* „ H. J. R. Pope.
„ F. Gale.
* „ W. N. Wright.
* „ R. W. Davies.
* „ H. B. Knight.
„ A. W. Reid.
* „ L. C. Welfare.
„ T. J. Carless.
„ E. H. Simmons.
* „ F. L. Somerset.
† „ J. Row.
† „ J. C. Garry.
„ A. Wall.
„ A. Smith.
„ F. Gregory.
Mr. W. H. Williamson.
„ E. Morgan.
„ C. H. Cordy.
* „ P. C. Woolston.
„ A. H. Jones.
* „ C. B. Harris.
„ F. H. Potts.
* „ E. J. Fowler.
„ H. S. Smith.
* Capt. G. H. Farrell.
Mr. J. B. Tutt.
„ F. S. H. Baldry.
* „ M. A. Hutchence.
† „ F. M. Hill.
„ G. F. Bushman.
† „ F. H. R. Bumbury.
* „ T. F. Spencer.
* „ F. E. Place.
„ D. G. Davies.
„ C. Harwood.
* „ W. F. Howes.
„ D. Pugh.

The following passed their First Examination :—

Mr. T. McCaffrey.
„ C. W. Brown.
* „ G. C. Lowe.
„ G. M. Pomery.
„ W. Collinson.
„ H. A. Sullivan.
„ A. H. Lane.
„ A. G. Tegg.
„ W. H. James.
* „ A. P. Case.
„ S. F. H. Thorn.
† „ F. S. Sikes.
„ W. B. Edward.
„ J. H. Lockwood.
* „ T. Kemp.
† „ V. D. O. Brown-Morrison.
„ A. G. Hillier.
„ P. J. Welch.
„ H. F. West.
„ W. Miles.
* „ W. P. Horsley.
„ C. S. Ware.
* „ W. N. Dobbing.
* „ J. Maguire.
„ T. J. Arman.
Mr. J. W. Wadsworth.
† „ T. A. Ford.
„ D. P. Davies.
„ W. W. Grasby.
† „ J. W. Reynolds.
„ A. M. Ward.
„ J. Toms.
„ H. S. Sawyer.
* „ J. H. Taylor.
„ G. T. Norman.
„ M. T. Sadler.
„ A. E. Clarke.
„ F. T. G. Hobday
„ A. E. Bayley.
„ A. I. Cattell.
„ A. Crofts.
„ C. C. Abrams.
„ J. E. Wallis.
* „ G. H. Williams.
* „ C. R. Edmonds.
* „ J. H. Shepherd.
„ J. H. Manton.
„ G. J. Harvey.
„ M. Fortescue.
„ J. D. Martin.

Mr. A. England.	Mr. F. B. Eve.
* „ W. T. Cade.	„ E. R. James.
„ F. W. Wilson.	„ A. B. R. Battye.
„ H. Sessions.	† „ W. R. Mills.

Marked thus * passed great credit.
„ „ † „ very great credit.

R. RUTHERFORD, F.R.C.V.S.,
Secretary, Court of Examiners.

CENTRAL VETERINARY MEDICAL SOCIETY.

AN Ordinary General Meeting was held at the First Avenue Hotel, Holborn, on 6th of June, Alfred Broad, Esq., the president, in the chair. There were present Professor Axe, Messrs. Banham, Elworthy, Gostling, Herron, Hunting, Hurndall, T. E. W. Lewis, Oatway, Rogers, Roots, Rowe, Samson, Simpson, Fred. Smith, Villar, Wheatley, Willis, Woodger, Wragg, and Wright.

Letters of apology for non-attendance were received from Professor Walley and Messrs. Prudames and Slocock.

Mr. GEORGE REDDISH, M.R.C.V.S., of 103, Stockwell Road, London, was unanimously elected a fellow of the society.

The PRESIDENT announced that a special meeting of the society would be held on the 4th of July, to take into consideration a report of the Council, as to certain Fellows whose subscriptions were much in arrear.

Mr. HERRON introduced a *post-mortem* specimen, consisting of a tooth-like growth upon a horse's ear.

Professor SMITH then addressed the meeting on "Our present knowledge of Navicular Disease."

The President, Professor Axe, and Messrs. Rowe and Hunting, took part in the discussion, on the conclusion of which Mr. SAMSON proposed and Mr. ROWE seconded a vote of thanks to Professor Smith for his address, which was unanimously carried.

S. VILLAR, *Secretary.*

MIDLAND COUNTIES VETERINARY MEDICAL ASSOCIATION.

A QUARTERLY MEETING of the Midland Counties Veterinary Association was held on May 24th, 1889, at the Star and Garter Hotel, Wolverhampton.

The PRESIDENT (Mr. Beddard, of Wolverhampton) occupied the chair, and there were also present: Professor Axe, Messrs. White, Wiggins, Wragg, Over, Coe, Cole, Blunt, Price, Barnes, Hodgkinson, Tailby, Fairbank, Pemberton, Lane, Turber, Barber, Goodall, Pritchard, Sen., Pritchard, Bailey, Collett, Dawes, Leather, James Blakeway, John Blakeway, F. Blakeway, Hodgkins, Carless, W. S. Carless, Perrins, Verney, Faulkner, Freer, Gorden, Smith, Reynolds, Jones, Stanley, Taylor, Cartwright, Wartnaby, Trigger, Parker, Merrick, Capt. Russell, Rossell, Paby, Chambers, and others.

Letters of apology for non-attending were received from Professors Pritchard, Williams, Walley, Sir H. Simpson, Dr. Fleming, Messrs. Locke, Hunting, Olver, Hill, Pyatt, Bryer, Dale, Barling, Banham, Kidd, and others.

Before the business of the meeting commenced, the President (Mr. Beddard) entertained the whole of the company present to a sumptuous luncheon in the Star and Garter Hotel. In a few well-chosen and felicitous remarks he gave the members a most cordial and hearty welcome to Wolverhampton. After ample justice had been done to the good things provided, the members removed to another room and the meeting commenced.

The first business was the nomination of new members:—The President proposed and Mr. Trigger seconded the election of Mr. Herbert Lloyd

Pemberton, of Bridgnorth. The President proposed and Mr. Smith seconded the election of Mr. David Fairbank, of Lichfield. The nomination of Mr. George Henry West, of Newent, Gloucestershire, was made by Mr. Malcolm and seconded by Mr. Wragg. Mr. John Blakeway proposed and Captain Russell seconded the election of Mr. Wright, M.R.C.V.S., Hospital Surgeon to the Royal Veterinary College. The nomination of Mr. J. E. Cartwright, of Skinner Street, Wolverhampton, was made by Mr. Carless, of Worcester, and seconded by the President. These nominees were all unanimously elected.

Mr. BLAKEWAY returned thanks to those members of the Association who had voted for his election as a member of the Council. He expressed some regret that he had not been chosen, inasmuch as the position was an honourable one; also on the ground that, having partly retired from the profession, he would have had plenty of time to devote to the duties of the office. He thought it was extremely important that a member of the Council should be a person who could attend its meetings regularly, and he drew attention to the fact that, during the eight years of his connection with that body his attendances would be found to have compared very favourably with those of any other member.

The PRESIDENT said that the next business on the agenda was the revision of the rules of the Association; but that as there were three horses to be operated on, it had been suggested that this question might advantageously be postponed until their next meeting. He would like, however, to mention the case of one rule, so that members might turn it over in their minds before the next meeting. It had reference to the hour of meeting, which was now 2.30. A great many members had urged that if they began the meeting at 2 o'clock and dined at 5, instead of 5.30, members who had long journeys to make would be greatly convenienced.

On the motion of Mr. MERRICK, seconded by Mr. STANNER, it was resolved that the revision of the rules should be adjourned to the next meeting of the Association.

The PRESIDENT announced that Mr. Wragg had very kindly brought to the meeting an interesting specimen of diseased kidney, but had consented to defer opening a discussion on the subject of kidney diseases till the next meeting, when, the President hoped, they might be able to go more fully into the matter than they could possibly do on the present occasion.

The PRESIDENT then delivered his inaugural address, which he prefaced by congratulating the Association on the presence of Professor Axe, and the fact that he was to perform a new operation for the cure of Roaring. Having this in view, the address would be curtailed as much as possible:—

Mr. VICE-PRESIDENT and GENTLEMEN,—In accepting the presidency of our Midland Counties Association, I assure you I value most highly the honour you have conferred upon me, and feel most deeply the importance and responsibility of my position. The knowledge of my own inability to perform the various duties to your satisfaction has been a source of great anxiety, and I therefore ask you, gentlemen, to kindly bear with me in my shortcomings, and believe me when I say it will be my most earnest and anxious endeavour to maintain the prosperous condition of the Association, and uphold the dignity of the presidential chair.

Veterinary associations have undoubtedly become most useful and powerful institutions, and with regard to our own, the Midland, I often think it must be very gratifying to those members who—no doubt with a vast amount of trouble, and often great disappointment—assisted in its foundation, to have watched its steady onward progress and its ever increasing usefulness, and considering the grand and noble cause for which it was first founded—that of promoting, or I would rather say, increasing the good feeling and social intercourse amongst its members, in addition to the imparting of knowledge and

the advancement of science—I think we should look back with feelings of gratitude to those first workers in the good cause.

I was very much struck with a remark that fell from the lips of Professor Pritchard at our last Annual Meeting. In speaking of the increased interest taken by the members in general, in what I may term "the political work of the profession," he said, when he was first elected to serve on the Council, he received nine votes; since then one member has received upwards of 900, and I see by the return this year 5,079 votes were recorded. Professor Pritchard said he believed this increased interest was due to the excellent work done by the various associations; and if this is so, and I am quite of opinion it is, it only shows the great and increasing value of such institutions.

In taking a short review of the veterinary profession, I think we can honestly congratulate ourselves upon having made great progress, both socially and scientifically. I know there is a difference of opinion as to whether or not our improved social position has anything whatever to do with our professional advancement, and I cannot for one moment imagine how such a difference of opinion can possibly exist. We are not all endowed with the gift, nor have we the opportunity of obtaining that scientific knowledge likely to benefit and advance the profession; but we all, simply as practitioners working in and for a grand and noble profession, have our opportunities of, and responsibility in maintaining and advancing our professional status. I consider every member who "either professionally or socially," by his high, honourable, and dignified conduct, gains the confidence and approval of the public, has at least done something for the future benefit of his profession. I am pleased to believe there is a greater observance than heretofore of that professional etiquette amongst practitioners which must exist if we are to progress, and I believe this is greatly due to the good work done by our medical associations. At the same time, I am bound to admit there is yet something very unsatisfactory; but I trust that by a higher educational standard and continued good work done by our Association, the evil will soon be remedied.

I would like to say a word with regard to the action lately taken respecting hereditary disease in entire horses. It is undoubtedly a step in the right direction, and certain to lead to good results, and I am very pleased to see the determination shown by the examiners at shows to carry out their duties without fear or favour; but, in my opinion, the restrictions are not carried far enough. I consider that no horse should be permitted to travel publicly if suffering from an hereditary disease, and I believe the time is not far distant when this will become law. It is a disgrace to our country to see some of the unsound animals travelling in our midst, spreading disease in every direction, and thus causing loss and disappointment to those obtaining their services; and I believe if we, as veterinary surgeons and advisers, were to take a prominent part in the suppression of the evil, we should receive the thanks and approval of the horse-loving public, and of the owner of every sound and honest entire horse.

There is a subject that has lately received a great amount of attention, both from the public and scientific bodies—the transmission of disease to the human subject from the consumption of diseased meat or contaminated milk. It is a subject of vital importance, and affords a most extensive field for study and research. I am much inclined to think the latter (milk) is frequently the source of evil, and from the great alteration that has lately taken place with regard to the place of its production, I am afraid it will become more dangerous unless some active steps are taken; hitherto large quantities of milk have been produced in towns, where the cow-sheds were under strict supervision and, apart from the owner's interest, were compulsorily kept in a sanitary condition. The bulk of our milk supply to large towns and cities now goes direct from the farm-houses, and from my knowledge of them and their

sanitary condition, I am afraid there is much greater danger. The cow-sheds upon many farms are old and badly constructed; there is little ventilation and still less drainage; the manure is allowed to accumulate in large quantities immediately outside the door, the soak from which frequently forms a small pool, and very often the cows are permitted to drink it—and, strange to say, they will drink it freely. As a rule, a large number of animals are kept; consequently the milking process occupies a considerable time, during which a great portion of the milk is exposed to these contaminating evils. I perhaps should not have mentioned this, had not a disastrous case of fever recently occurred within two miles of where we are seated, and I thought it a practical subject worthy of thought and inquiry.

There are several other subjects I should have liked to have touched upon, but as our time is limited for the interesting operations to be kindly performed by Professor Axe, I close by thanking you for the patient hearing you have accorded my crude and, I am afraid, uninteresting remarks, and I again thank you for granting me the opportunity and privilege of reading this, my inaugural address.

The PRESIDENT said that before they left they had a very important duty to discharge. He had a pleasing task before him, and he was sure that every member would join him very heartily in it. He asked them to support him in according the very best and warmest thanks to their retiring President for the very able and courteous manner in which he had presided over their meetings and conducted the business of the Association during his year of office. They knew that Mr. Trigger, during his presidency, had been the means of bringing before them some very interesting and instructive papers and subjects for discussion. He could testify that the retiring President had spared neither time nor trouble, nor—if he might be permitted to say so—expense, in endeavouring to carry out the duties in an efficient and dignified manner, and he thought that all the members would agree with him that Mr. Trigger had succeeded admirably in those endeavours. He had the very greatest pleasure in proposing a hearty vote of thanks to Mr. Trigger on his retiring from the presidential chair. They hoped that he would long live to adorn the veterinary profession, for whose advancement no one could have greater desire than Mr. Trigger had.

Captain RUSSELL seconded the motion, remarking that the retiring President had carried out his duties in a very able manner, and had shown himself the very man for the office.

Mr. MERRICK (Northampton) endorsed all that had been said by the President and the seconder of the motion. They had never had a more genial President. A more able man in the chair he had never had the pleasure of sitting under.

Mr. BLAKEWAY, as one of the senior officers of the Association, could entirely bear out all the remarks that had been made with regard to Mr. Trigger's performance of the duties of President. Mr. Trigger had done everything he possibly could to facilitate the work of the Hon. Secretary and Hon. Treasurer, and to promote the success of the Association generally.

The motion was carried by acclamation.

Mr. TRIGGER, in reply, said that he felt quite overwhelmed with the very kind reception they had given to the vote of thanks which their President had so ably and so kindly proposed—proposed in terms which he was sure he had failed to deserve. They had far more than repaid him for the time and trouble he had devoted to their interests, by their very cordial appreciation of his poor efforts. His year of office was universally pleasant, for he had received the greatest kindness and courtesy from every member of the Association. If there was one duty more pleasant than another during his year of office, and one that had already given evidence of its success, it was

that of proposing his successor. Their President's address that day and the reception he had met with assured them that if he (Mr. Trigger) had given satisfaction, his successor would far surpass him. In conclusion, he would say that he could not have got through his year of office so satisfactorily but for the great assistance he had received from their Honorary Secretary. He begged to propose that the thanks of the Association be given to the Secretary and other officers for their services during the past year.

Mr. OVER (Rugby) seconded the motion, which was carried unanimously.

The members then adjourned to the President's yard in Cleveland Street, where they witnessed a successful performance by Professor Axe of the new operation for the cure of Roaring upon three "roarers."

During the course of the operations, running comments were made by the Professor, each part being named as the knife passed through it, and special points of difficulty being briefly dwelt upon. After the completion of the operation, the Professor received quite an ovation, and was specially complimented by many present on the wonderful dexterity, surgical skill, and rapidity with which the operations were performed. The Professor then gave a short address on the after treatment, and gave instructions that the tampon cannula should be removed twenty-four hours after the operation; that afterwards antiseptic spray be thrown into the larynx three or four times each day, and the external wound kept clean, and any exuberant granulations cauterised. In four to six weeks the wounds would be healed, but ten weeks should be allowed to transpire before any test was adopted for trying the patient's wind.

The members afterwards dined together, and spent a very pleasant and enjoyable evening. Several songs were sung by Messrs. Leather, Faulkner, and other members present.

The usual toast list was gone through, and that of the President was received with musical honours and three times three, and thus a very happy and instructive meeting was brought to a close.

JNO. MALCOLM, *Hon. Sec.*

ROYAL SCOTTISH VETERINARY ASSOCIATION.

A QUARTERLY MEETING of this Society was held in the library of the Royal Veterinary College, Edinburgh, on May 1st, 1889.

The PRESIDENT (A. Reid, Esq.) occupied the chair.

The following members were present:—Professors Walley, McFadyean, and Baird; Messrs. Campbell, Pottie, Barclay, Baird, Combe, Scrymgeour, Fingzies, Young, and Fairbairn.

The minutes of the last meeting having been confirmed, the following gentlemen were elected members of the Society:—Messrs. Young, Harle, Bird, Cowan, and King, proposed by Professor McFadyean, and seconded by Mr. Barclay.

Professor Walley nominated for election Mr. Baines, Golspie.

The Secretary nominated for election Mr. King, Ayr.

Mr. Pottie, Paisley, then exhibited and explained a form of truss he had invented for the treatment of inguinal and scrotal hernia, claiming for it a distinct advance on the treatment of that form of hernia.

Mr. Campbell, Kirkcudbright, then explained and exhibited his form of truss, which appeared to be of a more simple form, and had been found by Mr. Campbell to have the desired effect.

A very interesting and profitable discussion ensued, most of the members taking part.

Professor WALLEY directed attention to several matters of professional interest.

(1) He exhibited a colossal diagram of a transverse section of a pleuro-pneumonic lung of a cow which had been subjected to the influence of boiling, and explained that very many years ago he directed the attention of his class to this method of dealing with the lung in cases where a doubt existed as to the nature of the lesion, the plugged condition of the vessels, the thickened state of the peribronchial tissue, and the bronchial mucosa; the thickening of the interlobular tissue and the consolidation of the lobules all being brought out in a much better manner by this method than by any other that could be adopted, and that too owing to the coagulation of the large quantity of albuminous matter which was arrested in the meshes of the different tissues involved in the lesion.

(2) He exhibited a large section of a multilocular (hydatid) cystic liver from a cow, in which the whole of the liver structure had been removed by the pressure of the cystic growths which were grouped together in a compact mass; giving the external surface a "paving-stone" aspect, and the surface of the section a "cavernous" aspect. The case came under the observation of Mr. John Roberts, of Wrexham, under whose treatment the cow had been for a short time prior to death. The symptoms were ambiguous, the most striking being a rotund appearance of the body, great emaciation, and excessive diarrhœa. On making a *post-mortem* examination, Mr. Roberts found an enormously enlarged liver, the gross weight of which was 1 cwt. 2 qrs. 5 lbs., a weight, Professor Walley remarked, far in excess of anything which had ever come under his personal observation, and from the extensive annihilation of liver tissue, the wonder to him was that the animal should have lived so long as she had done.

(3) He exhibited a number of monstrous lambs, and remarked that while the present season was probably one of the best lambing seasons, both for number and quality of lambs, it had been very prolific of monstrosities. The most interesting cases cited by him were (*a*) a pesocephalous monstrosity, in which on the anterior surface of the aborted head was seen a transverse irregularly shaped fissure, from either commissure of which a perfect (external) ear opened in a lateral direction. This specimen had been secured for him by the assistant inspector at the slaughter-house, Mr. Duoic. (*b*) A perosomian monstrosity, in which the head and thorax were single, and the posterior, dorsal, and the lumbar region were double, with eight legs, two tails, and four ears, one pair of which had their origin from a common base in the centre of the forehead. This specimen had been forwarded by Mr. Murray Lornie, of Alyth. (*c*) A monocephalian monstrosity, in which the head, neck, and forelegs were wanting, and the thorax fissured. Dissection revealed entire absence of thoracic and of urinary organs, of stomach, and, with the exception of scrotum and testicles, of generative organs. These testicles were situated one on either side, intimately attached to the reflected angle of the posterior false ribs. This specimen was forwarded by Mr. E. H. Jones, Mossley, Manchester.

Mr. Campbell's case was a polymelian or parasitic monstrosity.

Purpura Hæmorrhagica.

Professor Walley introduced the subject of Purpura, a disease which he said had raged to an unparalleled degree during the autumn and early winter months.

In the experience of most practitioners a few cases of the disease were annually met with, but the number of such cases—at least within a tolerably large area around Edinburgh—had never been so great as during the above-mentioned period. Purpura was not to be dreaded when influenza, strangles, and allied affections were prevalent, and when barometrical and local hygienic conditions were unfavourable, but during this season the affection

had assumed the proportions of an enzooty, and the cases were of an unusually intractable character. As the members had all probably experienced, there was in the autumn an epizooty of influenza of a comparatively mild type and of a catarrho-bilious character, and strangles also had prevailed to a tolerably large extent ; indeed it was as a sequel to the latter disease that many of the cases of Purpura had arisen, but in others—and he (Professor Walley) wished particularly to direct their attention to this point—the affection had made its appearance in animals in whom no (or only very slight) premonitory symptoms had been observed.

In reference to strangles, he might remark that during the autumn he had his attention directed to an outbreak in which eighteen out of twenty horses were affected, and in whom there was almost universally suppurative cellulitis, with the formation of unlimited abscesses in various parts of the body, and in only three or four of the animals did the disease run through its usual course. As the members had probably noticed, Mr. Malcolm, of Birmingham, had recently placed two outbreaks of a similar character on record.

As a sequel of strangles the first case which came under his notice occurred in a horse about which he was consulted by Mr. F. Tonar, M.R.C.V.S.

The symptons presented were those of septicæmia, combined with those of purpura, and from the general condition of the animal and the state of the buccal cavity, he (Professor Walley) expressed the opinion that they might expect at any moment symptoms of enteric disorder, followed rapidly by death.

He was at once informed that enteric symptoms had been shown several days previously, and that treatment for their amelioration had been adopted. This horse succumbed to the effects of the complicated disorder from which he was suffering in a few hours after his (Professor Walley's) visit, and on *post-mortem* Mr. Tonar found extensive disease of the great colon, which on being examined revealed a condition allied to that which is sometimes met with in cases of so-called enteric fever, viz., the formation of large sloughs of the intestinal mucosa and the submucosa. The condition so much resembled that shown in a sketch which he had had taken many years ago, and which he submitted for their inspection—as well as the specimen of which it was a representation—that he did not think it necessary to preserve it for their inspection.

On the 5th of December Mr. Barclay forwarded the stomach and a portion of the duodenum of a four-year old carriage gelding in which purpuric lesions were marked, and which (although it was considerably altered by preservation) he submitted for their inspection. When fresh the conditions presented were extensive hæmorrhagic and serous infiltration of the whole structure of the organs, the intramural distribution of the lesions imparting a stratified character to the section. In thickest parts the swelling was two inches in extent. The history of the case, as detailed by Mr. Barclay, was as follows:—The horse had been the subject of strangles for a period of three weeks. Early in the morning of the 3rd (3 a.m.) Mr. Barclay was hurriedly summoned to see the patient, the messenger stating that he had been rolling about since 7 o'clock the previous evening. On his arrival Mr. Barclay found all the symptoms of gastric tympany and gastric pain present, and treated the horse for these, relief being afforded in about an hour, from which time the animal stood in one position until death—which took place two hours subsequently—supervened. From the symptoms presented Mr. Barclay came to the conclusion that the horse was suffering either from gastric, intestinal, or diaphragmatic rupture. *Post-mortem* revealed a rupture, eighteen inches in extent, of the great colon in addition to the gastric lesions. The pyloric orifice was occluded by a large clot of blood ,which had been thrown out from the vessels of the mucous membrane.

About the same time he (Professor Walley) and his colleague (Mr. Baird) had under their joint care a desperate case following a period of several weeks of apparent convalescence from strangles, and in which tracheotomy had to be performed in order to prevent suffocation from bronchial effusion, and in the same establishment they had another horse convalescing from a severe attack of the disease (after influenza), in which lung lesions had been succeeded by putrid disintegration of the damaged lung tissue. He (Professor Walley) could not pretend to offer a satisfactory explanation of the extraordinary prevalence of this malady, but it had assumed such extensive proportions as to lead him to the conclusion that there must be some special atmospheric conditions which of themselves tended to depress the vital powers and to cause a perverted state of the functions and of nutrition, even if there was not some special causal entity such as a micro-organism. His experience in this outbreak had strongly confirmed one fact which he had previously observed, viz., that those animals who had previously suffered from lung affections, and in whose lungs there existed areas of damaged tissue, were extremely likely to suffer from rapid putrefactive disintegration of such tissue, and as a result from septicæmia; the absorption of the septic products he thought might, in some instances at least, explain the production of the purpuric lesions. He might also mention the fact that in one case the horse had suffered from an attack of purpura about eighteen months before, and at that time had made a good recovery, and further, in order to show that the causes in operation to produce the disease were not of a purely local character, he would direct their attention to the fact that the disease had appeared in large studs of horses in which it was previously absolutely unknown.

W. D. FAIRBAIRN, *Hon. Sec.*

YORKSHIRE VETERINARY MEDICAL SOCIETY.

THE following is the paper on Horse-shoeing read by Mr. Mason at the meeting of the above society, but which did not arrive in time to be inserted in the report in last month's Journal:—

Mr. PRESIDENT and GENTLEMEN,—The subject I have chosen to bring before your notice this afternoon, "Horse-shoeing and Machine-made Shoes," is an art of which individuals of every rank and grade of intelligence have their pet ideas, both as regards how a horse should be shod, and the different form of shoe to be required; in fact, so various and conflicting are the opinions expressed by those who profess to know all about this art that one wonders whether there is really any proper way of performing the operation.

I think we may start with the acknowledged fact that "shoeing" is a necessary evil; but by a careful performance of that operation this evil can be lessened to a great extent. The ancients of early times simply attached a narrow rim of iron to their horses' feet by a few rudely-shaped nails, and found that if allowed to remain the hoof became abnormally overgrown, and then the shoe required to be taken off, and the superfluous growth removed, or the animal made to travel without this narrow rim of iron until it was again needed.

Much has been written and many theories have been advanced on this subject; the most illiterate and scientific have grappled with this matter. The average growth of the entire wall of a medium-sized hoof is about twelve months. Many speak as to the advisability, for the proper preservation of the feet, to pare them at each shoeing, to thin the sole until it springs under the finger on pressure; others say on no account should the foot be touched, especially the sole and frog, the cutting of these parts producing such ailments as corns, canker, thrush, laminitis, and navicular arthritis. The toe

and heel also come in for discussion, as to whether the former be shortened and lowered, and the latter whether they are to be cut away. Some persons purposely cut down the heels with the idea that it prevents contraction, because flat feet always have low heels, and that by keeping the foot low it is a preventive for contraction; again, others, if the heels are cut away the back tendons are ruined.

The class of shoes and manner of applying are opinions just as varied. Some desire a heavy shoe to prevent concussions, others a light one to preserve elasticity. Then as to shape, the ordinary seated shoe some say is a most irrational shoe; some that instead of being concave on its inner surface it should be flat, so as to have a bearing both on wall and sole; others extol the Charlier system. The principal and great advantage of this shoe is the fact that the horse receives all the benefits of going barefoot, though he is shod.

Regarding the fitting of the shoe to the foot, we are told the shoe should never be applied hot, as it causes brittleness, by depriving the hoof of its natural moisture; others say a shoe cannot be fitted properly unless heated. The necessary number of nails required to hold the shoe in position is a debated question. Five nails is the average number, three on outer side and two inner side for any ordinary-sized foot. Clips are required at the toe, and materially keep the shoe in position. Some say they are a source of great mischief. Very often it is not the incapacity of the smith that is the cause of bad shoeing; he is so often required by the owner of the animal to be shod to perform the operation in such and such a manner, for many people have peculiar ideas regarding this operation. It is imperative that every horse-shoer should be well informed regarding the formation and structure he has to deal with in health and disease. Flat feet required to be shod in a different manner from a hollow foot, also it depends upon the kind of work the animal is required to perform.

There are very many methods of shoeing horses, each claiming special superiority; but I think no particular rule can be exclusively carried out, for a flat foot requires shoeing in a different manner to a hollow or concave foot; also it greatly depends on the kind of work the animal is required to perform. But there is one general rule to apply to every case, and that is an endeavour to preserve as far as possible the natural shape and condition of the foot. In the matter of cutting and paring the feet there is certainly far too much of it done; but I do not agree altogether that the drawing-knife be banished from every forge, and that the foot be only trimmed by the rasp. I consider the knife the most proper instrument to accomplish it with in the hands of those who are qualified to use it.

With regard to the theory that the sole never requires paring, we are told that the sole relieves itself of its waste material by natural process. Yes, so long as the foot is not encased by a shoe, and is permitted to come in contact with the ground, the consequent friction assists in the removal of superfluous horn from the sole. Certain forms of feet, flat or pumiced feet, even when shod for a considerable length of time, do not require any paring of sole, frog, or even walls; but there are forms of feet in which the growth of horn is most abundant, and when shod, even for a limited period, their partial deformity is evident, and the growth is not only confined to the wall of the hoof, but to the sole, and sometimes frog. Often on removal of the shoe an accumulation of waste horn is discovered, varying from three-quarters to half an inch in thickness, and which has no fibrous connection whatever with the true insensitive sole, and certainly serves no good in being allowed to remain; and I think for the good of the foot all such accumulation should be removed and this can be accomplished with a free use of the drawing-knife, and when the true fibrous structure of the sole is reached this process of paring should

stop. The walls also should be reduced to their natural proportions, but the healthy frog should never be touched with the knife.

The ordinary seated shoe I consider best adapted for draught-horses. Some people condemn it as a shoe which produces corns, but if this class of shoe is properly fitted and applied there is no such danger. Some argue that the shoe should in every case have a bearing alike upon sole as well as wall, but with that I cannot agree. A well-formed concave foot when in nature's state has very little connection with the ground, so far as the sole is concerned; the wall and frog are the only surfaces in immediate contact, and the foot maintains its healthy condition, and with not the least symptoms of lameness by the non-contact of the sole with the ground. In flat or pumiced feet, when the sole does really come in contact more or less with the ground, the feet, instead of being benefited, are, to a greater or lesser extent, damaged by such contact; in fact, animals with this condition of foot are actually benefited when shod, and with seated shoes, which have no bearing upon the sole. This seated shoe should always be made wide enough to cover not only the wall but also the connection between the sole and wall, and made to fit the foot and not the foot to fit the shoes; and the weight of such shoe in proportion to size of animal. Caulks to be made of equal length, and never to exceed half an inch. Very great damage is done to the feet by wearing caulks of too great length, and also of unequal length. Toe-clips, especially upon draught horseshoes, are beneficial, and to a great extent they materially assist in keeping the shoe in position upon the foot.

With regard to applying a hot shoe in fitting, I think to fit a shoe properly it is quite necessary, and if done judiciously no harm to the foot is done, and if the shoe be at a red heat an application of two or three seconds' duration is quite sufficient to mark any inequalities, and when by this means the surface of the hoof and that of the shoe are made perfectly to correspond the hot shoe to be again applied for two or three seconds, to thoroughly suit itself. This gives the shoe a far better bearing than could possibly be given to it either by the knife or rasp alone.

Having spoken of shoeing generally and of ideas which are very common even nowadays, I now pass on to special shoeing, either to prevent injuries or alleviate disease.

Cutting or Brushing, produced by defective action; cause may be defective conformation. Every farrier has an idea of stopping this cutting; but, as a rule, it is generally through idleness, weakness, or want of condition, and shoeing may have nothing to do with it. I have found, in cases of cutting, a shoe I may describe as a three-quarter-bar shoe advantageous in severe cases.

Speedy Cutting generally occurs when an animal is overpaced, or due to conformation. Use of a three-quarter shoe is often successful in such cases.

Clicking or Forging and Over-reach cause striking one or both of the front with one or both of the hind feet; or, in over-reach, by hitting heel of fore feet; may be prevented by lessening the length of the step by lowering and shortening the toes of hind feet. Concave front shoes, and shoe short. Light shoes are best.

Sandcrack and False Quarter.—In two kinds both require the same class of shoe, with no caulks. When at the toe allow no pressure upon wall on either side of the crack for quite an inch, and a clasp on each side.

If a sandcrack at quarter, a bar shoe is better, with pressure upon heel to prevent any movement when the weight of the horse is placed upon it; for if you leave a space, you will find that contact with the ground presses the horn down until it touches the shoe, and when the crack is in the quarter every such movement drags it open. But before placing the shoe on, be careful to rasp away lower edge of the wall of sandcrack for an inch each side of it, as mentioned before.

Corns.—Generally due to a bruised condition of the angle of the sensitive sole, caused by heel of shoe. Nothing so bad as a repeated bruising, for we get exostosis of angle of coffin-bone, and then always trouble of this part. Best shoe for a corn is a three-quarter shoe, or a bar-shoe in some severe cases. Care should be taken in searching or cutting corns; of course if matter exists, it is right to allow it to escape. Cutting away all the horn at the heel leaves the wall without its internal support, becoming a narrow ridge; and when weight is placed upon it it is forced inwards, causing pain and injury to inflamed structures within.

Once a corn always a corn, is the general idea; but with good shoeing the corn can be removed, and the foot acquire its original condition.

Concussion.—Nature has protected the foot against direct concussion. The hoof, with its hard wall and sole, are its chief protection, together with its elastic frog and the lateral cartilages. Sometimes some disease or injury happens, and the foot is contused. It is often necessary to guard against this concussion when no definite signs of disease are present; but only the change of action indicates to the observer that pain exists. With the milder forms of pain you get defective action; an animal going short, or not so free in action as usual. To prevent such conditions, india-rubber pads and ring-leathers are beneficial. It is often necessary to either protect a part by covering it up, or relieve it from pressure by preventing contact with the shoe.

Punctured Foot.—The horn having been removed for examination and treatment of the wound, then protection is necessary, and none better than tow and tar, and leather sole attached to the shoe.

Broken Feet.—Often the result of a lost shoe; the quarters or toe are broken away, so that any pressure causes pain. It is then necessary to relieve pressure; utilise those parts that are sound and which are generally towards the heels, making their bearing surface lengthened: you can nail well towards the heels, for the expansion of the foot upon the ground surface is so slight that no harm can take place; the expansion of the foot, as spoken of so much, taking place much higher up, viz., at the upper part of the heels between the lateral cartilages.

Convex Soles require a medium width of shoe, and must be carefully seated, so as not to cause any uneven pressure, and of sufficient thickness to prevent direct contact between the sole and the ground, and protection by a leather sole.

We so often see a shoe attached to such feet, termed generally a "saucer" shoe, a shoe which is seated from the extreme outer edge to the inner edge, so that the foot surface of the shoe presents an incline downwards to the centre; the weight of the horse forcing the foot down this incline compressing the whole of the foot, the very object in this case to avoid.

Seedy Toe.—The heels of the foot to be kept low, to avoid throwing weight forward as much as possible, and no caulkins to shoes. After the shoe is fitted remove the lower edge of the wall of the foot where affected with disease, so that a considerable space is left between the shoe and the diseased portion. As the hoof grows this space becomes less, and the shoes should not be allowed to remain on too long, for often lameness returns by the lower edge of the affected part bearing upon the shoe. The portion of the wall that is removed, singularly enough, grows faster than that which has bearing upon the shoe.

Contraction of Feet.—Any special shoeing is useless. It is possible to do without shoes in these cases; or by tips the hoof is protected by wear, and the back part of the foot allowed free play, the entire weight being thrown on the heels and frogs, increases their functional activity and promotes a healthy growth. Tips should be certainly removed once a month, or the toes will grow long and harm result.

It has been tried mechanically to expand the horse's foot by so fitting a shoe that the heels rested upon an inclined plane, exactly the opposite to the saucer shoe before mentioned, the bearing surface being inclined outwards. But this mechanical arrangement has not been attended with any marked success, only in some instances does it produce lameness.

Laminitis.—No better shoe or treatment can be more effectual than Mr. Broad's shoe, the heels of the foot to be kept low and the toe shortened. Apply a lightly nailed, extremely stout, wide-webbed and long-bar shoe; the shoe to be gradually thinned from behind the quarters to the heels, which enables the horse to throw his weight better than he can in ordinary shoes or none at all.

There are many other forms of special shoes, such as elongating the toe of the shoe for contracted tendons and ligaments, etc. But I will not weary you further upon this part of my subject, but allow me now to pass on to "machine-made shoes."

Machinery in these days has brought about so many changes, especially for trade purposes, that it is not surprising the shoeing of horses is no longer to remain altogether a handicraft: and no innovation of late years in horse-shoeing can approach in utility the present "machine-made horseshoes." Nearly the whole of our cavalry upon home service are shod with them after, I believe, most elaborate trials.

I believe the first known machine-made shoes were those of Louchaire, and made in Germany. The machine-made shoe leaves but little to be desired as regards shape, level, and nail-holes; and are sold as near-fore and hind and off-fore and hind; they are fullered, bevelled, have a level bearing, and are made in different sizes and of Swedish iron. Should machine-made shoes satisfy the demands of the art of shoeing—for it is unfortunately only too true that by far the greater number of our blacksmiths are unskilled workmen, and that properly-made shoes are exceptional, and I fear very many horses are ruined from bad shoeing, want of removes, etc.—we should obtain a better and much cheaper method; and these last factors would go far towards promoting a general introduction of these shoes. The defenders of the hand-made shoes say that every shoe must be made according to the foot, and therefore a machine-made shoe will never fit. But machine-made shoes are fitted in the same way as hand-made ones, and when good material is used alterations are easily made. It is not asserted that occasionally special shoes have not to be made for flat, full, or pumiced feet, horses that brush, or have weak or broken hoofs; but these are exceptions, and amongst the different sizes of the machine-made shoes there is choice sufficient to shoe nearly every horse properly.

The machine-made shoe has also produced the system of cold-shoeing, and is generally greatly recommended; and observations have proved that shoes may be well fitted and put on by the cold method. It is not as convenient, and it takes more time to fit a shoe cold than to burn it on, but there is no difficulty about the operation. The hoof to be reduced with the rasp, and get the bed so level that the bearing be even everywhere. A machine-made shoe must be made of the best iron, for no shoe can be put on without having its shape altered. The shoe to be fitted cold on the anvil, when it will be chiefly a question of widening or closing the shoe to the shape of the hoof. My own slight experience is confined to the machine-made shoes as devised by Dr. Fleming, Principal Veterinary Surgeon to Her Majesty's Forces, and adopted in the Army, and can be described as a concave fullered shoe, and perfectly flat upon the foot surface. The shoes are numbered in sizes from 1 to 8 for horses, and 1 to 6 for mules; and within this range they fit and suit all horses and mules with normally-shaped feet; they are applied cold, which means that a forge can be dispensed with.

I am of opinion that there is a great future in store for the machine-made shoes, and their economy and efficacy and application without the aid of a forge must in time cause them to be generally adopted, especially when they have become more perfected. Very many large companies have them in use in England, and there appears to be an increased demand for them both at home and abroad—a fact that goes far to prove their suitability.

Their introduction into the Army can only be fully understood and appreciated (I speak now as a late officer in the Army Veterinary Department) by those who have experienced the difficulty of keeping horses shod properly on field service. I now conclude with a mechanical arrangement, viz. the "nailless horseshoe," an invention that is attracting some attention, and which is said to be able to be applied to a horse's foot by anyone, who need not be an expert.

The nailless horseshoe is shaped like the ordinary shoe, but instead of being attached to the hoof by nails it is held in position by a band of steel, which passes in front of the hoof well below the coronet, and by three studs, two of which are set at opposite angles on each side of the toe, while the third is fixed immediately behind a pillar of steel, which rises in front of the shoe for the purpose of retaining the band in its place.

To fix this shoe it is necessary to raise the horse's foot, place the shoe in position, pass the band round the front of the hoof, and slip the loop in the centre of the band inside the prong, which is attached to the front pillars for that purpose. The shoe thus fixed is prevented from shifting either backwards or forwards by the shoe stud, and the band already mentioned and the front pillars; and the band passed round it effectually prevents the shoe from dropping off.

In conclusion, I may say that I wrote to the makers of the nailless shoes, telling them I was reading a paper on the subject of shoeing before this Association, and was wishful to bring a shoe before the meeting. They replied that they had no models, and I asked them to send a shoe and I would make my own models, but they replied they preferred to make their own models.

LONDON PATHOLOGICAL SOCIETY.

Multiple Symmetrical Tumours of Bones from a Dog.

At the meeting of this Society on May 21st, Mr. W. G. Spencer showed drawings and photographs of, and the bones of the fore and hind limbs from, a collie dog which had come under his notice at the Brown Institution. They showed the following points: 1, symmetry both on the fore and hind limbs; 2, that the tumours had advanced from the extremities as far up the fore limbs as the hind limbs; 3, that the progress had consisted in the growth of separate tumours from the bone, which had fused with one another into lobular masses; 4, that the tumours commenced on the dorsum of the fore and hind feet, and extended upwards; tumours in an early stage were seen in the lower part of the femur and humerus, which apparently commenced in the bone below the outer layer; they were parosteal rather than periosteal in origin. The dog was a fine valuable collie, aged four years, which had been well cared for, and with no history of any accident. The disease had been noticed twelve months before, as small tumours on the dorsum of the feet, which had grown considerably during the last six months. The tumours felt extremely hard; they caused no pain except towards the last, when slight tenderness was present over them. The dog became very fat in confinement. It was killed, and no further pathological lesions were found, except a scar on the lung, apparently from a parenchymatous rupture. On the limbs, the skin and subcutaneous tissue, including the under surface of the feet, were normal. On the dorsum of each foot there was a mass of the growth; another surrounded the tibio-fibula and radio-ulna. The

femora and humeri showed slight protuberances of the bone, but there were no changes in the soft parts which covered them. The tumours were not circumscribed; they had involved the muscles, and the tendons ran through and into them in grooves. Fibrous extensions of the growths surrounded the tendon sheaths beyond the limits of the tumours. The tumours were fibrous on section, and a little below the surface the knife arrived at extremely hard bone, which formed the base. Microscopically the structure was that of a fibro-myoma.

Dr. PAYNE thought the tumours were similar to those of multiple exostoses occasionally found in human beings.

Mr. BOWLBY thought the thickenings were probably of a purely inflammatory nature.

ROYAL AGRICULTURAL SOCIETY.

AT the June monthly Council meeting Sir John Thorold presented the following report:—

"*Pleuro-pneumonia.*—Between April 20th and May 25th (a period of five weeks) thirty-three fresh outbreaks of this disease have been reported in Great Britain, and eighty-two cattle found affected with it. In the corresponding period of last year there were fifty fresh outbreaks and 144 cattle attacked. In Ireland, fifteen outbreaks have occurred in the five weeks, and thirty-four cattle have been attacked, whereas in the corresponding weeks of last year there were twenty-four outbreaks and sixty cattle affected. The healthy cattle slaughtered because they had been in contact with the disease numbered 767 in Great Britain, and 187 in Ireland.

"*Anthrax.*—During the five weeks above mentioned there have been twenty-four fresh outbreaks of Anthrax in Great Britain, twenty-two of them in England, and two in Scotland: seventy-four animals were attacked, two of which were in Scotland, the rest in England; no less than forty-two of these cases were reported in one week in the county of Dorset, the affected animals being pigs. The other counties from which Anthrax returns have been received were Cornwall, Kent, Lancaster, Leicester, Northampton, Notts, Oxford, Somerset, and the Isle of Ely, in England; while in Scotland the disease existed in Forfar and Edinburgh.

"*Swine Fever.*—For the past few weeks this disease has been increasing, but not to any greater extent than usually occurs about this season of the year. In the five weeks ending May 25th there were 585 outbreaks reported, or an average of 117 per week; in the preceding sixteen weeks of this year the average was about seventy-eight per week. The number of pigs attacked was 2,811; of these, and about 300 left alive diseased from previous weeks, only 1,310 were killed, 1,061 died, 146 recovered, and 516 remained alive when the last return was made up."

A letter had been received from the Agricultural Department announcing that the Lords of the Committee of Council for Agriculture had suspended the operation of the Order of the 1st March, admitting animals free from Holland, until the first September next. Thirty-nine entries had been received for the horse-shoeing competition, six of which were for the exhibition of systems not in common use. A letter had been received from Mr. B. Freer, of Uppingham, accepting the appointment of Provincial Veterinary Surgeon for the county of Rutland.

The following report had been received from Mr. H. Crofts, the Society's Provincial Veterinary Surgeon for Bedfordshire:—

"In presenting my bi-annual report I have no very serious cases to bring before you. In the month of January last I had two cases of Anthrax, and at the same time also four separate outbreaks of Pneumonia in horses upon four separate farm premises.

"In the outbreak of Anthrax remedial measures proved most effective in arresting any further outbreak. In the cases of Pneumonia little could be effected in preventing the extension of the disease to the other horses upon the same premises, though contagion was not suspected. In all the total number of horses attacked was forty. The effect of medicine in arresting the progress of the disease was most satisfactory; not more than two of the thirty cases fell victims from the disease, whereas before the application of medicine three horses died, having received no medical aid. These were seen upon my first visit to each of three farmsteads, and found in a hopeless condition, the lungs being choked with a lymphy deposit. The primary cause of each of these outbreaks was the extremely cold and damp weather, acting upon premises low-lying and badly drained, and all upon a clay subsoil. At the same time, and on the same farms, horses and cattle remaining out in the fields and not housed escaped the disease in every case.

"(Signed) H. CROFTS, M.R.C.V.S."

GLASGOW VETERINARY COLLEGE.

THE winter session of this institution terminated on the 17th May, and on the 21st, 22nd, and 29th the examinations of the Royal College of Veterinary Surgeons were conducted within the museum of the college, the results of which are announced in another part of the Journal.

Medals granted by the Highland and Agricultural Society of Scotland; the late Professor Allan Thomson, of London; Mr. Thomas Campbell, F.R.C.V.S., Kirkcudbright; and Principal M'Call, and certificates of merit by the college, were awarded in the different branches of study as follows:—

Horse pathology (written examination).—Silver medal (H. and A. S. of S.), Mr. James Gregg; first-class certificates, Messrs. David Warnock, J. W. Peatt, and J. M. Graham; second-class certificates, M. Wilson, J. M. M'Dougall, and W. M. Hutchinson.

Cattle pathology (written examination).—Silver medal (H. and A. S. of S.), Mr. David Warnock; first-class certificates, Messrs. Gregg, Graham, and Peatt; second-class certificates, Messrs. Wilson and J. R. O'Reali.

Morbid anatomy (written examination).—First-class certificates, Messrs. Warnock, Gregg, and Hutchinson; second-class certificates, Messrs. M'Dougall, Wilson, and Peatt.

Practical examination of horses as to age, soundness, operations, etc.—Gold medal (Principal M'Call), Mr. M. Wilson.

Practical examination of cattle and sheep as to soundness, age, operations, etc.—Gold medal (Mr. Campbell), Mr. David Warnock.

Anatomy, special and comparative.—Medallist, Mr. J. K. Bruce; first-class certificates, Messrs. W. Davidson, A. Renfrew, and T. A. Trotter; second-class certificates, Messrs. W. Logan, G. Waddell, and J. Kirk.

Physiology (written examination).—Medallist, Mr. T. A. Trotter; first-class certificates, Messrs. J. K. Bruce, W. Davidson, A. Renfrew, and G. Waddell; second-class certificates, Messrs. J. Thompson, A. Millar, and C. A. Squair.

Best professional examination in anatomy.—Gold medal (the late Professor Allan Thomson), Mr. T. A. Trotter.

Junior anatomy.—Medallist, Mr. J. A. Gilruth; first-class certificates, Messrs. J. Forrest, S. C. Pottie, W. Marshall, and J. A. Jordan; second-class certificates, Messrs. R. Mason, J. D. Walker, and H. Hazeel.

Chemistry.—Medallist, Mr. J. Forrest; first-class certificates, Messrs. J. A. Gilruth, J. D. Walker, J. E. Johnston, W. Marshall, and W. Galloway; second-class certificates, Messrs. J. Douglas, R. Mason, and S. C. Pottie.

Botany.—Medallist, Mr. J. A. Gilruth; first-class certificates, Messrs. J. D. Walker, J. E. Johnston, J. Forrest, and J. Douglas; second-class certificates, Messrs. J. W. Neill and W. Galloway.

Principal M'Call's bursary of £20, or a gold medal the value of that amount, for the student who obtained the highest aggregate marks in his first and second professional examinations before the Board of Examiners, was divided between Messrs. J. K. Bruce and W. Logan, their marks being equal.

NEW VETERINARY COLLEGE, EDINBURGH.

THE examinations of the students of this school, by the examining board of the Royal College of Veterinary Surgeons, took place towards the end of May, with the results recorded elsewhere in the present number of the Journal, and the distribution of prizes to those of the students who had been successful took place on the 21st of that month, Professor Williams, Principal, presiding. The following is the prize list :—

The Principal's £20 Prize.—Gold medal, T. G. Duggle.

Horse Pathology.—Medal, F. Booth; first-class certificates, W. Stothert, J. Robertson; second-class certificates, T. M. Parker, E. F. de Jong, R. W. Davidson.

Cattle Pathology.—Medal, J. Robertson; first-class certificates, E. F. de Jong, T. G. Duggle; second-class certificates, W. Stothert, T. M. Parker, J. P. Isherwood, F. Booth.

Anatomy (Senior).—Medal, J. H. Parker; certificates, J. Brand, W. S. Lamont, Cockburn, L. Browne.

Physiology.—Medal, J. H. Parker; certificates, W. S. Lamont, R. J. Bushwell, J. Cockburn, E. Farn.

Histology.—Medal, R. J. Bushnell; certificates, J. H. Parker, E. Farn, J. Brand, W. S. Lamont, A. McGregor.

Chemistry.—Medals, Todd and Johnstone.

Practical Chemistry.—Medals, E. Haywood and A. G. Todd.

Elementary Anatomy.—Medal, R. E. Johnstone; certificates, R. Eagleshan, C. Haywood.

Botany.—Medal, J. Connochie; certificates, C. Haywood, R. E. Johnstone, J. Farmer, J. H. Diddle.

Curators of Museum.—Medals, E. Franklin and E. F. de Jong.

For Practice.—Medals, W. Stothert, E. K. Burton.

Demonstrator of Pathology.—Medal, J. Robertson.

Agricultural : Veterinary Hygiene.—Principal's class: Medal, J. J. Jeffray. Professor W. O. Williams's class: Medal, D. J. Gilchrist.

Army Veterinary Department.

Gazette, June 11th.

Veterinary-Surgeon George Richard Griffith has been seconded for service with the Egyptian Army. Dated 27th May.

The undermentioned Veterinary Surgeons on probation to be Veterinary Surgeons (ranking as Lieutenants). Dated 28th November, 1888 :—

Thomas E. W. Lewis.
Eugene W. Larnder.

Augustus Charles Newson, gent., to be Veterinary Surgeon on probation, vice Veterinary Surgeon G. R. Griffith, seconded. Dated 12th June.

The Annual Dinner of the Department was held in the Hotel Metropole, on June 21st. Principal Veterinary Surgeon Dr. Fleming, C.B., was in the chair, and there were present Inspecting Veterinary Surgeons Lambert, Walters, Steel (retired), Veterinary Surgeons F. Walker, W. Pallin (retired), Marshall (retired), Thomson, Duck, Poyser, J. W. Evans, Oliver, Ringe, Burton, Longhurst, Edwards, Short, Glover, Kettle, D. C. Pallin, Lewis,

Savage, Killick, Finlayson, Fenton, F. Smith, Whitfield, Morgan, Jones, Matthews, Philips, F. Raymond, A. F. Appleton, Bennett, Haslam, Newsom.

Veterinary Surgeon A. G. Lawson has arrived in England on sick leave, having suffered from a very severe attack of Smallpox, the infection of which was received while he was serving in Burma.

Mr. E. E. Bennett acted as a judge of horse-shoeing for four days at the Royal Agricultural Society's show at Windsor.

Obituary.

The following deaths of Members of the Royal College have been reported:—

J. B. Jones, Ludlow, Salop,	who graduated	in	1837.
G. Harrison, Stafford	"	"	1842.
H. R. Bradshaw, Dublin	"	"	1874.
P. B. Ferguson, Manchester	"	"	1843.
J. Symes, Wincanton	"	"	1869.

Notes and News.

Docking Horses in the United States of America.—The following are the terms of an Act recently proposed in the Massachusetts Legislature by Geo. T. Angell, President of the State Society for the Prevention of Cruelty to Animals:—"Section 1. Whoever shall mutilate any horse by cutting the solid parts of the tail in the operations known as docking or pricking, and whoever shall cause the same to be done or assist in doing the same, unless the same shall be clearly proved to be a benefit to the horse, shall be punished by imprisonment in gaol not exceeding one year, or by fine of not less than one hundred dollars, and not exceeding two hundred and fifty dollars, and fines collected upon, or resulting from the complaint or information of an officer or agent of the Massachusetts Society for the Prevention of Cruelty to Animals, shall be paid over to said Society in aid of the benevolent objects for which it was incorporated."

Hydrophobia in Paris.—Dr. Dujardin-Beaumetz, Director of the Hospital Cochin, has presented to the Board of Health of the Department of the Seine his yearly report upon cases of Hydrophobia occurring in the department. In the year 1888, nineteen persons died of this disease, which is a greater number than for many years past, save in 1881 and 1886. Of the deaths in 1888, three were due to bites of cats and sixteen to bites of dogs. In two cases there was no bite at all, the virus being conveyed by the tongue of the animal in licking. The period of incubation of the disease in the nineteen cases varied from twenty-five to forty days. It appears that the diagnosis of Rabies is not so simple a matter as is commonly supposed. In four cases diagnosed the doctors went entirely wrong. In one case the disease was found to be Tetanus, in three others Angina, Diabetes, and Delirium Tremens. The concluding portions of M. Dujardin-Beaumetz's report is devoted to a consideration of the treatment of Rabies by the Pasteur method. In 1887 there were 306 persons reported in Paris as bitten. The madness of the biting animal was demonstrated in 263 cases. Out of the total of 306 cases only three were fatal, which put the mortality at .97 for each 100 if all the cases are taken, or at 1.14 for each 100 if only the cases in which the biting animal was surely mad are taken. The above 306 cases were treated by Pasteur's method. There were also reported during the same year 47 cases of persons bitten who did not receive treatment by inoculation. Out of these seven died. The figures for 1888 tell almost exactly the same story. Only four persons out of 385 treated by the Pasteur method died.

SHAMEFUL TORTURE OF PIGS.—Calcutta's newest institution is a swine-torturing yard, where some low-caste natives indulge in the most fiendish practices. For instance, writes a correspondent of the *Homeward Mail*, "a huge fire is lighted, and a live pig, with its feet tied together, is thrown into it to be roasted alive; or the poor beast is tied up by its four legs to as many posts in an open space, and about half-a-dozen men, with red-hot spears, fly at it, poking at the sides, and thrusting the weapons into its eyes, nostrils, and mouth (the spears being reheated now and then at a fire kept burning for the purpose close by), till the animal is tortured to death."

RABIES IN THE UNITED KINGDOM.—In Great Britain, during the first seven weeks of the last quarter, 35 cases of Rabies have been reported, all of them in dogs; they have been distributed as follows:—Cheshire 1, Kent 8, Lancashire 2, London 8, Middlesex 5, Notts 1, Oxford 1, Surrey 2, and York (West Riding) 7. It will be seen from these figures that the disease is most prevalent in and around London. In Ireland during the seven weeks above mentioned 87 cases of Rabies have been reported, 30 in Ulster, 28 in Munster, 24 in Leinster, and 5 in Connaught. The animals affected were 39 dogs, 16 cattle, 23 sheep, 5 goats, 2 swine, 1 horse, and 1 donkey.

A REMARKABLE OLD MARE.—Professor Degive, of the Brussels Veterinary School, describes a mare at Hainaut, which is thirty-eight years of age, and which is in good health, does a fair amount of work, and still masticates her oats well. Last February, when Degive saw her, she was very sound and moved freely. She was then in foal, had produced a foal last year, and the owner asserted that she must have brought forth at least thirty foals. He had owned her since she was three years old.

PROTRACTED INCUBATION OF RABIES.—In April, 1887, a Russian peasant named Orgijewsky, of Bendera, was bitten by a rabid wolf, and sent to the bacteriological laboratory at Odessa, where he was inoculated after Pasteur's method. Nineteen months after he became affected with Hydrophobia, and died.

HYDROPHOBIA IN BAVARIA.—From 1863 to 1876 from fourteen to thirty-one persons died each year in Bavaria from the bites of mad dogs. A striking contrast to this is presented by the experience of the last seven years, during which period only three deaths from Hydrophobia have occurred in a population of five and a half millions. This result is attributed to the strict enforcement of the regulation that every dog is at once killed who is found without a collar with a mark signifying that the tax on the animal for the current year has been paid. By this means stray curs without owners are easily eliminated.

Correspondence.

FAIR REPORTING.

SIR,—I hope the Journal will report *verbatim* what Sir Frederick Fitzwygram said with regard to Mr. Kidd's attempt at the last Council meeting of the R.C.V.S. to have the minutes of the previous meeting read. I see that Mr. Hunting's paper makes no mention whatever of the rebuke administered. Had it been administered to any member holding the "dual appointment," the paper in question would have given prominence to it, and its readers would have been favoured with a leading article on the subject. Mr. Kidd has been sent to the Council with a special authority, and no doubt means to "put things right." His first attempt was somewhat disastrous.

June 10th. "CHONDRIN."

VERY DESIRABLE.

SIR,—Cannot something be done to facilitate business at the annual meetings of the Royal College of Veterinary Surgeons? The meeting is announced for 12 o'clock, but really there is nothing done until an hour afterwards, and

then time is wasted and the great majority present disgusted by having to listen to nonsense talked by some men who like to hear themselves talk, or individuals on the back seats who are allowed to bawl and brawl to their heart's content, happy only when abusive. Time with me and many others is of some consequence, and I must confess that the hours expended in the unedifying occupation of listening to such persons who have no claim whatever to such indulgence, but rather the contrary, can be badly spared. The annual meeting for the last two or three years has been made in the highest degree unsatisfactory by the rowdy element in the profession, and I hope, sir, that steps will be taken to render its proceedings more orderly and respectable by suppressing that element.

June 2nd. "BUSY PRACTITIONER."

NATIONAL VETERINARY ASSOCIATION.

DEAR SIR,—May we trouble you to kindly announce to your readers, that the Seventh General Meeting of the National Veterinary Association will be held on July 24th and 25th, 1889, at the Society of Arts Rooms, John Street, Adelphi, London.

The following subjects will be brought forward for discussion:—

1. Cow-Pox. By Professor E. Crookshank.
2. Diseases of the Urinary and Generative Organs. By Mr. A. E. Macgillivray.
3. Some Contagious Skin Diseases of the Horse. By Prof. W. A. Edgar.
4. Mechanical Aids to Diagnosis. By Mr. W. Hunting.

Members of the Profession (not members of the Association) are invited to attend the meeting as visitors, and join in the discussion, if they will forward their names and addresses to the *General* Secretary, when a card of admission will be remitted to them.

SIDNEY VILLAR, *Hon. Local Secretary.*
GEORGE A. BANHAM, *Hon. General Secretary,*
Downing Street, Cambridge.

Communications, Books, Journals, etc., Received.

COMMUNICATIONS have been received from A. Peters, Boston, U.S.A.; Professor McCall, Glasgow; R. W. Burke, A.V.D., Athlone; J. Malcolm, Birmingham; R. Rutherford, Edinburgh; J. C. Berne, A.V.D., Portsmouth; Prof. Williams, Edinburgh; A. W. Hill, London; S. Villar, Harrow; T. B. Goodall, Christchurch; Dr. Duncan, Toronto; P. R. Gordon, Queensland; "Chondrin;" "Busy Practitioner."

BOOKS AND PAMPHLETS: *A. Koch*, Encyklopädie der Gesammten Thierheilkunde und Thierzucht (Band V., VI.); *Dr. R. A. Smith*, The Physiology of the Domestic Animals; *Drs. F. Boschetti and R. Bassi*, Fleming's Trattato di Ostetricia Veterinaria (3a dispensa); Journal of the Royal United Service Institution; *J. Csokor*, Lehrbuch der Gerichtlichen Thierheilkunde; Le Cidre et le Poiré; Bulletin et Memoires de la Société Centrale de Médecine Veterinaire; *H. Moller*, Lehrbuch der Augenheilkunde für Thierarzte; Bulletin des Séances de la Société Nationale d'Agriculture de France.

JOURNALS, ETC.: *Deutsche Zeitschrift für Thiermedicin und Vergleichende Pathologie; Recueil de Méd. Vétérinaire; American Veterinary Review; Annals de Méd. Vétérinaire; La Clinica Veterinaria; L'Echo Vétérinaire; Wochenschrift für Thierheilkunde und Viehzucht; Der Hufschmied; Journal of Medicine and Dosimetric Therapeutics; Revue Vétérinaire; American Live Stock Journal; Der Thierarzt; Mark Lane Express; London Medical Record; Medical Press and Circular; Edinburgh Medical Journal; Lancet; British Medical Journal; Journal de Med. Vétérinaire; Live Stock Journal; Bell's Weekly Messenger; Quarterly Journal of Veterinary Science in India.*

NEWSPAPERS: *Glasgow Herald; Scottish Leader; Irish Times; Guardian; East Anglian Daily Times; Manchester Courier; Brisbane Courier.*